United States Department of the Interior

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MAY 24 2005

Memorandum

To: Superintendent, Carlsbad Caverns National Park, USDI National Park Service, Carlsbad, New Mexico

From; Field Supervisor, USDI Fish and Wildlife Service, New Mexico Ecological Services Field Office, Albuquerque, New Mexico

Subject: Biological Opinion for Carlsbad Caverns National Park's Fire Management Plan

This responds to your January 11, 2005, Biological Assessment (BA) for the proposal to implement the USDI National Park Service (NPS) Carlsbad Caverns National Park (Park) Fire Management Plan (FMP), New Mexico (NPS 2005a). The BA evaluates the potential impacts of this project on the Mexican spotted owl (*Strix occidentalis lucida*) (MSO) and on the Lee pincushion cactus (*Coryphantha sneedii* var. *leei*) and Sneed pincushion cactus (*Coryphantha sneedii* var. *sneedii*). You have determined that the proposed action "may affect, is likely to adversely affect" the MSO and the Lee and Sneed pincushion cacti and requested formal consultation. There is no designated critical habitat for the MSO or the Lee or Sneed pincushion cacti in the project area. Therefore, no critical habitat will be affected by this project.

The USDI Fish and Wildlife Service (Service) is committed to fuels reduction projects and fully supports the proposed project to reduce the risk of stand-replacing fires, especially in areas with sensitive resources. Threats of wide-scale habitat loss due to fire are real and immediate on many public lands. Reducing fuels in these areas also may help to protect habitat for threatened and endangered species. For example, the MSO Recovery Plan (Recovery Plan) (USDI Fish and Wildlife Service 1995) recognizes catastrophic wildfire as the greatest threat to the MSO and its habitat. Reduction in habitat and various habitat-based threats contributed to the listing of the MSO. Forest thinning, often in conjunction with prescribed fires, is extremely important as a management tool needed to enhance, and often to restore many of the ecosystem functions and processes. The long-term benefits to the MSO of many land management actions may contribute, in the short-term, to certain adverse affects to the MSO. Projects, such as the current one, fall into this category. Therefore, it is important to address adverse impacts by minimizing, to the greatest extent practical, those short-term adverse affects and move forward with proactive land management to restore ecosystem functions and community dynamics.

The Recovery Plan encourages fire management programs that have an active role in fuels management (USDI Fish and Wildlife Service 1995). The Recovery Plan also recognizes that

catastrophic wildfire is one of the primary threats to the MSO in the Basin and Range East Recovery Unit, where the current proposed project is located. Therefore, fire/fuels management programs play a dual role in being potentially beneficial and a threat to the MSO and its habitat. The Service stresses the need to apply adaptive management when conducting fuels management projects. Prescriptions should be structured to maintain key habitat features (e.g., large trees, snags, logs, overstory, and hardwoods) for the MSO and its prey, while reducing the risk of catastrophic wildfire. Treatments should produce or maintain such habitat components and must be assessed by a rigorous monitoring program to determine if treatment objectives for the MSO and fuels reduction were met in the short- and long-term. Wholesale use of fuels management programs, without understanding or monitoring effects on habitat may render many of these areas unusable to the MSO and may miss opportunities to improve our knowledge of these programs on habitat.

This document represents our biological opinion (BO) for the MSO and the Lee and Sneed pincushion cacti in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act).

Consultation History

Informal consultation on the Carlsbad Caverns National Park (Park) fire management program was initiated March 29, 2000, with a telephone conversation between the Park and the Service. The conversation concerned the development of a programmatic fire management plan (FMP) for the Park and the consultation requirements and procedures for implementing a final FMP. On February 15, 2002, the Park met with the Service and provided an update on the development of the FMP. During the meeting, the agencies discussed how to minimize and/or avoid project related impacts to the MSO and the Lee and Sneed pincushion cacti. On June 18, 2002, the Service provided the Park a Technical Assistance Memorandum (Cons. # 2-22-02-F-467) containing recommendations to minimize or avoid project related impacts to the MSO and the federally listed cacti. On November 19, 2003, the Park provided the Service a biological assessment (BA) for the FMP and requested formal consultation on the MSO and the Lee and Sneed pincushion cacti. On December 1, 2003, the Service informed the Park that formal consultation had begun pursuant to their request (Cons. # 2-22-04-F-128). On February 18, 2004, the Service met with the Park to discuss the formal consultation process and timeline. As a result of this meeting and subsequent conversations, the two agencies agreed to postpone completion of the BO until a National Environmental Policy Act analysis was completed. On January 11, 2005, the Park completed a draft environmental assessment (EA), submitted a revised BA, and requested completion of the BO for their proposed FMP.

This BO is based on information provided in the current BA; the March 4, 2005, environmental assessment (EA) for the project, meetings, e-mails and telephone conversations between our staffs; data in our files; data presented in the Recovery Plan (USDI Fish and Wildlife Service 1995); literature review; and other sources of information including the final rules to list the MSO as threatened (USDI Fish and Wildlife Service 1993; 58 FR 14248) and the final rule to designate critical habitat (USDI Fish and Wildlife Service 2004; 69 FR 53182). References cited

in this BO are not a complete bibliography of all literature available on the MSO or cacti, the proposed action, or on other subjects considered in this BO. A complete administrative record of this consultation is on file at this office. We received all the information necessary to begin formal consultation on January 11, 2005, when you submitted the revised BA and requested formal consultation.

DESCRIPTION OF THE PROPOSED ACTION

The proposed FMP will guide all aspects of the Park's fire and fuels management program including fire suppression, wildland fire use for a resource benefit (WFURB), prescribed fire, non-fire fuel treatments (e.g., manual and mechanical thinning), and monitoring and adaptive management from 2005 through 2014 (NPS 2005, 2005a). The final FMP will serve as an operations manual and will provide a framework for making fire and fuels management decisions. This document will identify and describe fire and resource management goals and objectives as listed within the EA (NPS 2005). When completed, the Park's FMP will prescribe actions necessary to implement NPS fire management policies (DO-18) (NPS 2003) and to achieve the Park's resource management goals and objectives (NPS 2005). The FMP will be finalized shortly after a decision notice is signed for this project. The Service assumes that the final FMP will not differ from the proposed action, which is described briefly below. Refer to the BA and EA for more information on the proposed action (NPS 2005, 2005a).

The EA lists the following fire management goals:

1. Protect people and property as the highest priority of every fire management activity;
2. Protect the Park's natural and cultural resources from the undesirable effects of fire and suppression;
3. Suppress unwanted fire;
4. Maintain or restore fire as a natural dynamic ecosystem process;
5. Use WFURB and prescribed fire for resource management purposes; and
6. Facilitate joint planning and implementation of fire operations with neighboring agencies and private landowners;

Fire Management Units

The action area includes approximately 46,766 acres of Park, 22,000 acres of adjacent USDA Forest Service (Forest Service) lands, and 17,000 acres of adjacent USDI Bureau of Land Management (BLM) lands. Under the proposed FMP, the Park would be divided into two fire management units (FMUs). FMU 1 would include developed areas (i.e., Park headquarters and Rattlesnake Springs), and lands in the eastern portion of the Park adjacent to White's City (NPS 2005, 2005a). Fire management activities within FMU 1 would include suppression, manual fuels reduction, and prescribed fire. All unplanned fires in this unit would be suppressed to protect human safety and public and private property.

The remainder of the park would fall within FMU 2. Fire management activities within FMU 2

would include suppression of all unplanned human caused fires, manual fuels reduction, prescribed fire, and WFURB. Manual fuels reduction projects would also be used on a limited basis, primarily to remove fuels from around sensitive cultural and natural resource areas. WFURB would be considered for implementation when conditions are within prescription and other criteria are met (e.g. see Appendix B, Table 1). Because FMU 2 contains habitat important to the MSO and Lee and Sneed pincushion cacti, the NPS has proposed conservation measures to minimize or avoid impacts to these species (see "Conservation Measures" section below).

Fire Treatment Zones

The proposed FMP would divide the Park into five treatment zones. Four of these zones would occur in FMU 1 and three would occur in FMU 2. Fire treatment zones include:

Wildland Fire Use Study Zone (29,026 acres): This zone would be located within FMU 2 and include the entire west end of the Park to the eastern edge of Rattlesnake Canyon. The Wildland Fire Use Study Zone contains the majority of the Park's woodlands and forests, and WFURB would be the primary fire management tool utilized. Although prescribed fire could be implemented in this zone, much of this zone has burned in the last 35 years and is within the natural fire occurrence. Because this zone contains habitats that may be suitable and/or occupied by the MSO, one of the primary fire management goals for this zone would be to study the effects of fire on vegetation and MSO.

Escarpment Prescribed Fire Zone (6,523 acres): Approximately 6,042 acres of the Escarpment Prescribed Fire Zone would be located in FMU 2, the remaining 481 acres would be located in FMU 1. This zone runs along the southern boundary of the Park to the base of the Guadalupe Escarpment and is dominated by desert shrubland and grassland. Historically, most of the naturally ignited fires occurring in this zone originated in the plains south of the Park. Over time, land use practices and development south of the Park have limited these natural fire processes. As a result, recurrent prescribed fire may be implemented to replace the historic role of fire in the Escarpment Prescribed Fire Zone. One of the primary fire management goals for zone would be to use prescribed fire to decrease shrub cover and re-attract the bannertail kangaroo rat. Under the proposed FMP, approximately 481 acres of the Taboosa Flats area in the far eastern portion of this zone would be burned with prescribed fire in 2007.

Walnut Canyon Prescribed Fire Zone (10,965 acres): The majority of the Walnut Canyon Prescribed Fire Zone would be located in FMU 2 and would be managed primarily with prescribed fire and WFURB. However, a small portion of this zone near White's City would be located in FMU 1 where WFURB would be excluded. Much of the Walnut Canyon Prescribed Fire Zone has burned with prescribed fire over the last 15 years and is within the natural fire occurrence. In the North Boundary area of this zone, prescribed fire would be used to provide defensible space and provide the Park greater flexibility in implementing WFURB in the Park interior. Prescribed fire may also be used to reduce fuels before allowing WFURB to occur. Like the Wildland Fire Use Study Zone, portions of this zone may contain suitable and/or occupied MSO habitat. One of the primary management goals for this zone would be to study

the effects of fire on the Lee and Sneed pincushion cacti and the MSO. Under the proposed FMP, approximately 42 acres of this zone would be burned with prescribed fire in 2008, 117 acres in 2010, and 3,636 acres in 2012.

Visitor Center Prescribed Fire Zone (165 acres): The visitor center prescribed fire zone is located entirely within FMU 1 to the west and east of the visitor center. Prescribed fire would be used in this zone to reduce fuels around the visitor center complex and decrease the risk of wildland fire overtaking the complex. Under the proposed FMP, approximately 58 acres of this zone would be treated with prescribed fire in 2008, and 107 acres would be treated with prescribed fire in 2009.

Mechanical Treatment Zone (87 acres): The Mechanical Treatment Zone is located entirely within FMU 1. This zone includes the Rattlesnake Springs unit and the visitor center complex. Mechanical and manual treatments would be utilized in these zones to protect sensitive resources and Park infrastructure from fire. The majority of the Mechanical Treatment Zone has been surveyed for Lee and Sneed pincushion cacti and none were found. This zone is also not believed to contain suitable habitat for the MSO. Under the proposed FMP, all 87 acres of this zone would be manually and/or mechanically treated in 2006.

Fire Management Plan Tools

The proposed FMP would include five fire management tools:

Suppression

The proposed FMP includes actions that relate to suppression of wildfires. Suppression involves extinguishing a fire that is burning outside of prescription parameters (e.g. rate of spread is too high), is not meeting fire and resource objectives, or is in a location designated as a suppression zone or may pose an immediate threat to life or property. When suppression actions are taken, the first concern would be firefighter safety. No suppression action would be taken that places firefighters at unnecessary risk. After firefighter safety is assured, suppression actions would be conducted in a manner that minimizes impacts to resources in the burn area. Impacts would be reduced through minimum impact suppression tactics (MIST).

MIST would include using natural or existing fire barriers (e.g., talus slopes, bare areas, trails, and roads) rather than constructing firelines. MIST would also include locating spike camps in areas where disturbance would be minimal and restoration would be readily achievable. Through the use of MIST, agency resource advisors would be consulted prior to implementing fire management actions. However, should life or property be in danger, a superintendent has the authority to allow mechanized control and suppression methods.

Prescribed Fire

Prescribed fire would be implemented for two reasons: 1) to reduce fuels so that the undesirable

effects of high intensity or high severity fires can be avoided; and 2) to emulate a natural fire regime to maintain or restore landscapes that evolved with recurrent fire. Recurrent prescribed fire may be necessary where landscapes cannot be maintained solely with natural fire because of landscape fragmentation or land management practices (e.g., the Escarpment Prescribed Fire Zone). Prescribed fire may be also used to transition a landscape with an unnaturally high fuel load into a landscape with a lower fuel load capable of being managed with WFURB (e.g., Walnut Canyon Prescribed Fire Zone).

Prior to the ignition of prescribed fire, a written fire plan would be completed and approved. This plan would guide the prescribed fire burn boss and crew on properly implementing the proposed burn. Prescribed fires would be monitored by a systematic process of collecting and recording data on safety conditions, vegetation, topography, weather, air quality, fire behavior and fire effects. This information would then be used to determine if the fire is within prescription and if fire and resource management goals and objectives are being met. In addition, annual reviews of prescribed fires would be conducted to refine prescriptions and improve performance.

Wildland Fire Use for Resource Benefit

WFURB would include allowing naturally ignited fires to burn within a predefined area under a set of predefined prescriptions to benefit natural resources. Using an Appropriate Management Response (AMR), these fires would be allowed to burn with some degree of certainty that the fire would either go out naturally or that managers could contain it within predefined areas.

AMR would be implemented whenever a naturally ignited fire is being considered for WFURB and would continue throughout the duration of the fire. The spectrum for decision making following an ignition has broadened under the National Fire Plan AMR. Consideration would be given to resource values affected, management goals and objectives, weather, available personnel and equipment, and other NPS regional priorities. Goals and management objectives would be determined in advance and stated in the Park's FMP. Even when all criteria are met, regional fire activity and limited available personnel may result in the suppression of natural fires that could be WFURB candidates. Under AMR, when all criteria are met, fires would be allowed to burn in designated areas and would be monitored closely in accordance with the 2003 NPS Fire Monitoring Handbook and the Wildland Fire Situation Analysis decision process. During WFURB, the Park would continuously update information on fire size, location, behavior, smoke dispersal, safety conditions, and effects.

Manual Fuels Reduction

Manual fuels reduction would include the manual removal, reduction, and ultimate restructuring of flammable vegetation or dead and downed wood with powered or unpowered hand tools. The exception to the use of hand tools would be the use of tractor-drawn mowers along roads. Manual fuels reduction would be undertaken where the presence of fire poses a significant risk to cultural or natural resources, park infrastructure, or unique areas. Manual fuels reduction

projects would not occur in areas believed occupied by MSO. These projects may however, occur in areas occupied by the Lee and Sneed pincushion cacti. In areas occupied by the cacti, conservation measures would be implemented to minimize or avoid project related impacts (see "Conservation Measures" section below).

The Park Service did not identify specific fire prescriptions in the BA or EA, but we assume these will be developed in the FMP and will be carried through in project-specific burn plans as they are designed and implemented. Prescribed and WFURB prescriptions will include measurable criteria that define conditions under which a fire may be ignited or allowed to burn, guide selection of appropriate management responses, and indicate other required actions. Prescription criteria may include safety, economic, public health, environmental, geographic, administrative, social or legal considerations, and incorporate the risk management process (NPS 1999). Both WFURB and prescribed fires are closely monitored to meet the defined resource or prescription objectives.

The NPS has mandatory elements for each prescribed fire project plan, including pre-burn considerations such as specifying precautions and treatments to protect endangered species (NPS 1999, 2003, 2003a). The NPS will also develop a Wildland Fire Implementation Plan that is an assessment and operational management plan that documents the analysis and selection of strategies and describes the appropriate management response for a WFURB. For each fire, there will also be a Wildland Fire Situation Analysis, which is a decision-making process that evaluates alternative suppression strategies against selected environmental, social, political and economic criteria. This analysis provides a record of decisions. For these reasons, we assume that the Park will use a systematic decision making process to determine the most appropriate management strategy for all unplanned ignitions (i.e., WFURB) and for any prescribed fires that are no longer meeting resource or prescription objectives. The NPS wildfire management planning and implementation process described in Directors Order 18 and Reference Manual-18 will be followed and are hereby incorporated by reference (NPS 1999, 2003).

Additionally, decision criteria (also called a "Go, No-Go Run Sheet") will be used to evaluate whether a wildfire will be suppressed or allowed to burn as a WFURB. Table 1 identifies decision criteria that have been used in other Parks (e.g., Guadalupe Mountains National Park, Texas) (Appendix B). We assume that the forthcoming FMP will use similar criteria. As noted above, WFURB and prescribed fires will also be monitored in order to evaluate whether resource and fire management objectives are met or if a fire exceeds prescription and should be suppressed.

Fire monitoring plans are a required element of the NPS's fire use program (NPS 1999, 2003, 2003a). The BA included a general discussion on monitoring, as described above, but did not include a detailed fire monitoring plan. Nevertheless, the NPS has developed a fire monitoring handbook, which contains standardized protocols for monitoring and documenting fire behavior and effects http://www.nps.gov/fire/fire/fir_eco_firemonitoring.html. The handbook provides a system to document burning conditions and fire behavior, insure that fires remain within set conditions, verify completion of burn objectives, and follow long-term trends. Therefore, we

assume that the Park will follow the NPS program requirements that provide the following four levels of monitoring: 1) environmental planning; 2) fire observations; 3) immediate post-fire effects; and 4) long-term change (NPS 1999; 2003, 2003a).

Despite the best intentions, actions related to the suppression or management of fire may create the need for short-term or long-term rehabilitation. The Park will use NPS fire and resource management staff to determine short- and long-term needs and to write, implement, and monitor emergency stabilization plans as necessary for each fire. The NPS will follow Directors Order 18, Reference Manual-18, and the Department of Interior's burned area emergency rehabilitation handbook (NPS 1999, 2003). We assume that coordination with the Service regarding rehabilitation activities within MSO habitat will also occur during rehabilitation activities.

In the past, the NPS has coordinated with the Service and, when appropriate, initiated emergency section 7 consultation for suppression activities when they may affect federally listed species. Under the current proposal, the NPS has incorporated conservation measures and MIST to minimize or avoid impacts to the MSO and its habitat (see conservation measures section below and MIST in the EA and BA). The Act's section 7 regulations provide for emergency consultations during "situations involving acts of God, disasters, casualties, national defense or security emergencies, etc." (50 CFR 402.05). Our primary objective during any emergency situation is to provide conservation recommendations for minimizing adverse effects to listed species without impeding response efforts. Protecting human life and property should come first every time. Consequently, no constraints for protection of listed species or their critical habitat will be recommended if they place human lives or structures in danger. We assume coordination with the Service regarding wildfire suppression activities will continue. Through this coordination, we anticipate that conservation recommendations will be continually adapting, as their effectiveness for minimizing impacts to the Lee and Sneed pincushion cacti and MSO are evaluated.

Conservation Measures

The following were identified in the BA as part of the proposed action. These conservation measures were evaluated below as part of our jeopardy analysis. They are intended to minimize or avoid adverse impacts to the Lee and Sneed pincushion cacti and the MSO. Therefore, these actions are non-discretionary, and must be undertaken by the NPS because they are part of the proposed action. If they are not fully implemented, the Service should be contacted to determine if reinitiation of formal consultation is required (50 CFR 402.16). The following conservation measures will be implemented for the Lee and Sneed pincushion cacti and the MSO:

General:

1. Management agencies and firefighters will be informed of the fire management plan before fire management actions are implemented;

2. Biological resource advisors will be dispatched to all fires;

3. Where possible, natural barriers will be used as fire lines;

4. Fireline construction, clearing, and scraping will be minimized;

5. Where practical, water drops would be used in lieu of fire retardant;

6. Project specific surveys will be conducted in all suitable Lee and Sneed cacti and MSO habitat prior to prescribed fire;

7. Vegetative manipulations in protected or restricted MSO habitat would be commensurate with the MSO recovery plan;

8. The Park would seek funding to conduct MSO surveys following Service protocols. After occupied sites are known, a more comprehensive fire evaluation and response plan would be developed, including restoration actions if needed; and

9. The Park would seek funding for a variety of fire ecology studies, including studying the effects of fire on the Lee and Sneed pincushion cacti.

The Service assumes that when these measures are implemented, documentation and reporting will also occur.

STATUS OF THE SPECIES (range-wide)

Mexican spotted owl

a. Species/critical habitat description

The MSO was listed as threatened on March 16, 1993 (USDI Fish and Wildlife Service 1993). The Service was ordered to re-propose critical habitat by April 13, 2004, the final rule on MSO critical habitat was published on August 30, 2004 (USDI Fish and Wildlife Service 2004).

The American Ornithologist's Union recognizes three spotted owl subspecies: California spotted owl (*S. o. occidentalis*), Mexican spotted owl (*S. o. lucida*), and northern spotted owl (*S. o. caurina*). The MSO is distinguished from the California and northern subspecies by plumage, genetic makeup, and geographic distribution. This owl is mottled in appearance with irregular white and brown spots on its abdomen, back and head. Its white spots are larger and more numerous than in other subspecies giving it a lighter appearance. Several thin white bands mark its brown tail. Unlike most other owls, all spotted owls have dark eyes.

S. o. lucida has the largest geographic range of the three subspecies. Its range extends from Aguascalientes, Mexico, through the mountains of Arizona, New Mexico, and western Texas, the canyons of southern Utah, and the Front Range of central Colorado. The MSO's distribution

is fragmented throughout its range, corresponding to forested mountains and rocky canyon lands (USDI Fish and Wildlife Service 1995, Tarango et al. 1997, Young et al. 1997, Sureda and Morrison 1998, Gutierrez et al. 1995, Peery et al. 1999, Sorrentino and Ward 2003).

b. Life history

The MSO occupies a broad geographical area, but does not occur uniformly throughout its range (USDI Fish and Wildlife Service 1995). Instead, the MSO occurs in disjunct localities that correspond to isolated mountain systems and canyons. The MSO is frequently associated with mature mixed-conifer, pine-oak, and riparian forests (Ganey et al. 1988, Skaggs and Raitt 1988, Ganey and Balda 1989, Gutierrez and Rinkevich 1991, Willey 1993, Fletcher and Hollis 1994, Ganey and Dick 1995, Gutierrez et al. 1995, Seamans and Gutierrez, 1995, Ward et al. 1995). Mature mixed-conifer forests are mostly composed of Douglas-fir (*Psuedotsuga menziesii*), white fir (*Abies concolor*), limber pine (*Pinus flexilis*) or blue spruce (*Picea pungens*). Pine-oak forests are mostly composed of ponderosa pine (*Pinus ponderosa*) and Gambel oak (*Quercus gambellii*). Riparian forests are dominated by various species of broadleaved deciduous trees and shrubs (USDI Fish and Wildlife Service 1995). Riparian forests function as important components of ecosystems supporting MSOs. These communities, particularly mature, multilayered forests, can be important linkages between otherwise isolated subpopulations of MSOs (USDI Fish and Wildlife Service 1995). They may serve as direct avenues of movement between mountain ranges or as stopover sites and connect large expanses of landscape that otherwise would be inhospitable to dispersing MSOs. Historical evidence shows that MSOs once nested in riparian habitats (USDI Fish and Wildlife Service 1995).

MSOs breed sporadically and do not nest every year (Gutierrez et al. 1995). Calling activity increases from March through May (although nesting females are largely silent during April and early May), and then declines from June through November (Gutierrez et al. 1995). MSOs are usually silent from December through February (Gutierrez et al. 1995). Courtship begins in March with pairs roosting together during the day and calling to each other at dusk (Ganey 1988). Eggs are laid in late March or early April (Delaney et al. 1999). The incubation is approximately 30 days and performed entirely by the female (Ganey 1988, Forsman et al. 1984). Foraging is entirely by males during incubation and the first half of the brooding period, females leave the nest only to defecate, regurgitate pellets, or receive prey from their mate (Forsman et al. 1984, Ganey 1988).

MSOs are highly selective for roosting and nesting habitat, but forage in a wider array of habitats (USDI Fish and Wildlife Service 1995, Ganey and Balda 1994, Seamans and Gutierrez 1995). Roosting and nesting habitat exhibit certain identifiable features, including large trees with trunk diameters greater than 12 inches (in) (30.5 centimeters [cm]), high tree basal area, uneven-aged tree stands, multi-storied canopy, moderate to high canopy closure, and decadence in the form of downed logs and snags (Ganey and Balda 1989, Ganey and Dick 1995, Grubb et al. 1997, Tarango et al. 1997, Peery et al. 1999, Ganey et al. 2000, Geo-Marine 2004). Canopy closure is typically greater than 40 percent (Ganey and Balda 1989, Fletcher 1990, Zwank et al. 1994, Grubb et al. 1997, Tanrango et al. 1997, Ganey et al. 1998, Young et al. 1998, Ganey et al. 2000,

Geo-Marine 2004).

All nests reported by Zwank et al. (1994), Seamans and Gutierrez (1995), and Geo-Marine (2004) were in mixed-conifer or Douglas-fir habitat. Roost and nest trees were the oldest and largest within tree stands (Ganey and Balda 1989, 1994, Seamans and Gutierrez 1995). MSOs use areas that contain a number of large trees of different types including mixed-conifer and pine-oak with smaller trees under the canopy of the larger trees. These types of areas provide vertical structure and high plant species richness that are important to MSOs (Ganey and Dick 1995, Seamans and Gutierrez 1995, Ganey et al. 2003). Tarango et al. (1994) and Ganey et al. (2000) recorded seven or more tree species at roost sites. Therefore, mixed-conifer dominated by Douglas-fir, pine-oak, and riparian forests with high tree diversity are important to the MSO. Juvenile MSOs disperse from their natal territories in September and October, into a variety of habitats ranging from high-elevation forests to pinon-juniper woodlands and riparian areas surrounded by desert grasslands (Gutierrez et al. 1995, Arsenault et al. 1997, Willey and c. Van Riper 2000). Observations of long-distance juvenile dispersal provide evidence that they use widely spaced islands of suitable habitat which are connected at lower elevations by pinon-juniper and riparian forests. MSOs have been observed moving across open low desert landscapes between islands of suitable breeding habitat (Arsenault et al. 1997, Ganey et al. 1998, Willey 1998). MSO movements were also observed between sky island mountain ranges in New Mexico (Gutierrez et al. 1996). As a result of these movement patterns, isolated populations may have genetic significance to the MSO's conservation (Keitt et al. 1995, Gutierrez and Harrison 1996, Seamans et al. 1999, Willey and c. Van Riper 2000). Therefore, contiguous stands or islands of suitable mixed-conifer, pine-oak, and riparian forests are important to the MSO.

MSO foraging habitat includes a wide variety of forest conditions, canyon bottoms, cliff faces, tops of canyon rims, and riparian areas (Gutierrez and Rinkevich 1991, Willey 1993). Ganey and Balda (1994) reported that MSOs foraged more frequently in unlogged forests containing uneven-aged stands of Douglas-fir and white fir, with a strong component of ponderosa pine, than in managed forests.

The primary MSO prey species are woodrats (*Neotoma* spp.), peromyscid mice (*Peromyscus* spp.), and microtine voles (*Microtus* spp.) (USDI Fish and Wildlife Service 1995, Young et al. 1997, Delaney et al. 1999, Seamans and Gutierrez 1999). Mexican woodrats (*N. mexicana*) are typically found in areas with considerable shrub or understory tree cover and high log volumes, or rocky outcrops associated with pinon-juniper woodlands (Sureda and Morrison 1998 Ward 2001). Sureda and Morrison (1998) and Ward (2001) found deer mice (*P. maniculatus*) to be more abundant and widespread in the 60 to 100 year old stands of mixed-conifer forests. Mexican voles (*M. mexicanus*) are associated with mountain meadows and high herbaceous cover, primarily grasses whereas, long-tailed voles (*M. longicaudus*) are found in dry forest habitats with dense herbaceous cover, primarily forbs, many shrubs, and limited tree cover (Ward 2001). High levels of MSO reproductive success and production may be due to prey abundance (Delaney et al. 1999). Ward and Block (1995) documented an increase in MSO production when moderate to high levels of woodrats, peromyscid mice, and voles, were consumed. A diverse prey base is dependant on availability and quality of diverse habitats.

MSO prey species need adequate levels of residual plant cover, understory cover, and high log volume. Therefore, a wide variety of forest and vegetative conditions are important to the MSO and its prey.

c. Population dynamics

Historic population size estimates and range of the MSO are not known however, present population size and distribution are thought to be similar (USDI Fish and Wildlife Service 1995). Ninety-one percent of known MSOs existing in the United States between 1990 and 1993 occurred on land administered by the Forest Service (USDI Fish and Wildlife Service 1995). Most MSOs have been found within the 11 National Forests of Arizona and New Mexico. It is unknown why Colorado and Utah support fewer MSOs. In 2002, Forest Service reported 987 PACs in Arizona and New Mexico (USDA Forest Service 2002). Additional surveys are likely to document more MSOs on Forest Service and other lands. For example, Geo-Marine (2004) reported an additional 26 activity centers not previously designated by the Gila National Forest. Current information suggests there are 15 PACs in Colorado, 105 PACs in Utah, and 43 PACs on NPS lands in Arizona, therefore, 1,176 PACs have been identified. Based on this number of MSO sites, we believe that the total known MSO numbers on Federal lands in southwestern United States range from 1,176 or 2,352, depending on whether one bird or a pair occupies the PAC. Seamans et al. (1999) reported evidence of 10 percent or greater population declines in central Arizona and west-central New Mexico. Both populations experienced lower survival rates in the late 1990's. Gutierrez et al. (2003) concluded that with four additional years of data on these same populations, the decline observed by Seamans et al. (1999) on the Arizona study area was temporary, whereas the decline in New Mexico appeared to be continuing. Wide population fluctuations may be common for populations of MSOs (Gutierrez et al. 2003).

The Upper Gila Mountain Recovery Unit (RU) has the largest known percent of MSO PACs (63 percent), followed by the Basin and Range-West, (16 percent), Basin and Range-East (14 percent), Southern Rocky Mountain-New Mexico (5 percent), and Colorado Plateau (2 percent) (USDA Forest Service 2002). Reports of PAC occupancy range from 68 to 79 percent in the Lincoln and Gila National Forests, respectively (Geo-Marine 2003, Sorrentino and Ward 2003, Ward et al. 2003).

d. Status and distribution

Two primary reasons were cited for listing the MSO as threatened in 1993: 1) Historical alteration of its habitat as the result of timber management practices, specifically the use of even-aged silviculture, and the threat of these practices continuing; and 2) the danger of catastrophic wildfire. Another factor that contributed to declines included the lack of adequate existing regulatory mechanisms. The Recovery Plan also notes that forest management has created habitats favored by great horned owls, increasing the likelihood of predation. Other threats identified in the Recovery Plan include the potential for increasing malicious and accidental anthropogenic harm (e.g., shooting and vehicle collisions), and for the barred owl to expand its range, resulting in competition or hybridization with the MSO. The Recovery Plan outlines

management actions that guide land management agencies in efforts to remove recognized threats and recover the MSO.

Bond et al. (2002) described short-term effects of wildfires on MSOs throughout the species' range. The authors reported that relatively large wildfires that burned nest and roost areas appeared to have little short-term (1-year) effect on survival, site fidelity, mate fidelity, and reproductive success of MSOs, as rates were similar to estimates independent of fire. However, Elliot (1995), MacCracken et al. (1996), and Gaines et al. (1997) reported in some cases, large stand-replacing wildfires appeared to have a negative effect on MSOs. Jenness (2000) reported low- to moderate-severity fires did not adversely affect MSOs. Bond et al. (2002) hypothesized that MSOs may withstand the immediate, short-term effects of fire occurring at primarily low- to moderate-severities within their territory. The Forest Service reported similar results following the 2002 Lakes Fire in the Jemez Mountains of north-central New Mexico (USDA Forest Service 2003). Danney Salas (USDA Forest Service, pers. comm., 2003) reported that of the 10 PACs that are monitored within the footprint of the Scott Able Fire, MSOs were detected in 9 of them. He also reported that the same number of MSO pairs before and after the Bridge Fire were detected and reproduced within the burn area. He also indicated that there were two MSO nest areas found in areas where fire retardant was used during suppression activities. Given historical fire regimes within its range, the MSO may be adapted to survive wildfires of various size and severities. Therefore, prescribed burning and other forest management activities could be an effective tool to reduce fire risk and restore forests to natural conditions with short-term impacts to MSOs. For example, prescribed fire may prove useful in the creation or maintenance of habitat for MSOs or their prey (Gutierrez et al. 2003). Bond et al. (2002) cautioned that programmatic prescribed burning in MSO territories could not be justified solely on their observations. Manipulative experiments are needed to evaluate effects of fire (or other forest management activities) on MSOs (Bond et al. 2002).

Geo-Marine, Inc. (2003) results suggest that MSOs avoid areas with aircraft noise and were found in areas with low aircraft noise. Johnson and Reynolds (2002) and Geo-Marine, Inc. (2003) reported that MSOs did not flush from their roost or nest as a response to aircraft noise. Delaney et al. (1999) found that MSOs did not flush when noise stimuli from helicopters and chainsaws were greater than 115 yards (yds) (105 meters [m]) away. Chainsaws were more disturbing to MSOs than helicopter flights at comparable distances (Delaney et al. 1999). Delaney et al. (1999) recommended a 115-yd buffer for helicopter overflights to minimize MSO flushing responses and any potential effects on nesting activity. Other recommendations were diurnal flights and separating overflights along the same path by seven days (Delaney et al. 1999).

Sneed and Lee pincushion cacti

Species Description, Life History, and Population Dynamics

Sneed pincushion cactus was first collected by J. R. Sneed in 1921 from the Franklin Mountains, El Paso County, Texas, and was described by Britton and Rose as *Escobaria sneedii* (Britton and

Rose 1923). This plant grows in rock cracks of limestone ledges in steep rugged terrain of the Franklin Mountains and Bishop's Cap at elevations of 4,300 to 5,400 feet.

Lee pincushion was first collected in 1924 by W. T. Lee. In 1925, it was named *Neomammillaria leei* by J. N. Rose, but the name is not valid under the code of botanical nomenclature because a description was not written for the plant (Weniger 1970, Benson, 1982). Frederick Bodeker made an incomplete description (but sufficient for the code) calling the plant *Escobaria leei* (U.S. Fish and Wildlife Service 1986). In 1967, E. F. Castetter and Prince Pierce published the first complete description of the Lee pincushion cactus (Castetter and Pierce 1967). In 1969, Lyman Benson named the cactus *Coryphantha sneedii* var *leei* (Benson 1969).

Both the Sneed and Lee pincushion cacti are many branched, forming tight clumps of up to 100 or more stems that form small dense clusters. Individual stems are 0.5 to 1.2 inches in diameter and 1 to 3 inches long. These cacti are sympatric, but can be distinguished from one another by the arrangement of the spines. Variety *sneedii* has spines that are spread parallel to the stem surface, and are not deflexed (turned around), while spines of var. *leei* are deflexed and drooping toward the stem. Both cacti flower in April and May (USDI. Fish and Wildlife Service 1986). The fruits are grayish-green, or greenish tinged with brown, or rarely pink when ripe.

Status and distribution

The Sneed pincushion cactus, (*Coryphantha sneedii* var *sneedii*) was listed as endangered on November 7, 1979 (44 FR 64741), whereas the Lee pincushion cactus, (*C. sneedii* var *leei*) was listed as threatened on October 25, 1979 (44 FR 61554). Critical habitat was not designated for either species. The Sneed pincushion cactus is known to occur in Franklin Mountains, El Paso County, Texas, in Eddy County, New Mexico on the Lincoln National Forest and the Park. Two individuals historically occurred within Guadalupe Mountains National Park, Texas. The Lee pincushion is only known to occur in Eddy County, New Mexico on the eastern edge of the Guadalupe Mountains. Potential habitat includes limestone slopes, ledges, and ridgetops at 4,100-5,900 feet elevation (USDI Fish and Wildlife 1986).

The Sneed and Lee pincushion cacti grow in semi-desert grassland (Brown 1982). The Sneed pincushion cactus is restricted to limestone and grows in cracks on vertical cliffs or ledges. Lee pincushion is found almost entirely in the Park. The Lee pincushion cactus is restricted to the Tansil Limestone Formation and grows on north-facing ledges. These formations are generally hard, resistant to erosion, and support a sparse vegetation of low shrubs, some rosette-forming perennials, many cacti, and both annual and perennial herbs.

This taxon is part of a complex of semi-differentiated named populations that are allopatric in the mountain ranges of southern New Mexico and southwestern Texas. The variation continues to present difficult taxonomic problems because the variety of *C. sneedii* var *Leei* intergrades with other forms of *C. sneedii* in the Guadalupe Mountains.

These species are locally common within their very restricted area of distribution. Both species are popular with collectors and have been subject to commercial collecting in the past (USDI Fish and Wildlife Service 1986, Robbins 2003). These cacti are now propagated commercially on a large scale, are readily available, and likely not subject to overcollection (USDI Fish and Wildlife 1986, New Mexico Rare Plant Council 2005). Much of the known occupied habitats occur in relatively remote areas, which are unlikely to be converted to land uses other than open range for livestock grazing, except the Franklin Mountains adjacent to El Paso, Texas (USDI Fish and Wildlife Service 1986).

A variety of *C. sneedi* occurs within the Park and is morphologically indistinguishable from *C. sneedii* var *sneedii*. This cactus is found within the same general area and habitat types as Lee pincushion (Baker and Johnson 2000). Recent work indicates that this variety of *C. sneedi* is an intermediate between Sneed and Lee pincushion cacti (Backer and Johnson 2000). Therefore, for this BO, Sneed pincushion is considered to occur in the Park though some particulars of this taxon are unknown at this time. Sneed's pincushion is grouped with the Lee pincushion analysis since the varieties may be similarly affected by fire and the proposed action.

ENVIRONMENTAL BASELINE

Under section 7(a)(2) of the Act, when considering the effects of the action on federally listed species, we are required to take into consideration the environmental baseline. Regulations implementing the Act (50 FR 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone section 7 consultation, and the impacts of State and private actions that are contemporaneous with the consultation in progress. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation. The action area has been defined as the Park and adjacent Forest Service and BLM lands. Thus, the action area includes Sneed and Lee pincushion cacti and MSO habitat outside the boundary of the Park that have the potential to be affected from the proposed FMP.

STATUS OF THE SPECIES (within the Action Area)

Mexican spotted owl

The Park is located approximately 20 miles southwest of Carlsbad, in Eddy County, New Mexico. It encompasses approximately 46,766 acres of federally administered land, 71 percent of which (33,125 acres) is designated wilderness (NPS 2005a). The elevation of the Park ranges from 3,595 to 6,520 feet with 85 percent of the plant associations comprised of desert shrublands, semi-grasslands, montane grasslands, shrublands, and woodlands. The Park is characterized by steep-walled canyons with caves and ledges that include limited ponderosa pine and maple-oak ravine woodlands (NPS 2005a). These woodlands comprise approximately 4 percent of the Park and tend to occur on north-facing slopes at an elevation above 4,920 feet.

The Park is within the Basin and Range East RU. The Basin and Range East RU contains the second highest concentration of known MSO sites (16 percent) in the United States. Because of the high concentration of MSOs, the Basin and Range East RU has been referred to as an important MSO distribution center in the Recovery Plan. This subspecies occurs in isolated mountain ranges scattered across the Basin and Range East RU, but the largest portion of the MSO subpopulation occurs in the Sacramento Mountains. MSOs are most common in mixed-conifer forest, but have been located in ponderosa pine forest and pinon/juniper woodland on a few occasions (Skaggs and Raitt 1988). The MSO has been reported on National Forest lands in the Sandia, Manzano, Sacramento, and Guadalupe Mountains, as well as the Guadalupe National Park and on Mescalero Apache Nation lands (Service 1995a).

The range-wide population of the MSO is naturally fragmented into geographically distinct subpopulations. Because of its size and location, the Basin and Range East RU likely plays a very important role in the metapopulation dynamics of the MSO in the southwest (Stacey 2000). However, other authors believe that the MSO population in the Sacramento Mountains likely contributes very little to other subpopulations (e.g., Ward 2001). Nevertheless, dispersal is the mechanism that connects subpopulations and the larger metapopulation (e.g., see Gutierrez *et al.* 1996; Ganey *et al.* 1998). Adult and subadult MSOs are relatively sedentary; however, juveniles almost always disperse from their natal sites (Service 1995a and references therein). Consequently, the key to maintaining connectivity between distinct subpopulations appears to be reproduction (i.e., the production of juveniles that are likely to disperse). It is likely that weather, habitat condition, the MSO's population structure, and prey availability all interact to influence variation in the MSO's reproductive performance (Ward 2001).

MSOs occurring in and adjacent to the action area have been exposed to various disturbances for more than a century. Disturbances include forest fires and human disturbances, including timber and fuelwood harvest, grazing, land development, and recreation. According to the Recovery Plan, the greatest threats in the Basin and Range East RU, in order of potential effects, are catastrophic fire, timber harvest, fuelwood harvest, grazing, human developments, and forest insects and disease. Other activities that are considered potential threats to the MSO include certain military operations, other habitat alterations (such as powerlines and roads), mining, and recreation. Recovery in this unit will require management and maintenance of existing and future populations by managing and conserving habitats in areas not only inhabited by MSOs, but also in unoccupied suitable or potentially suitable habitats (Service 1995a).

Fire studies at nearby Guadalupe Mountains National Park and elsewhere in the Guadalupe Mountains suggest fire may have been a regular event prior to the 20th century. Small fires burned in mixed coniferous forest in the Guadalupes on average every 17 years from 1554-1842 (Ahlstrand 1981). At Guadalupe Mountains National Park, a fire history project was initiated in 2003. From the late 1800s through 1922, fires occurred on average every 30 years. Fire scars from 1808, 1830, 1842, 1857, and 1879 indicate that on average these low intensity fires burned about 1,300 acres.

Fire is also a natural disturbance in much of the Park's desert shrubland and grassland

communities, although its role in these habitats is not fully understood (NPS 2005a). Over the last 20 years, most large fires at the Park have initially resulted in an increase in grass cover and a reduction of shrub, cactus, and agave cover. Although most shrub species are top-killed by fire, they typically re-sprout during the first or second growing seasons (NPS 2005a). Ahlstrand (1982 cited in NPS 2005) has suggested burning every 10 to 15 years to keep shrubs from dominating the landscape at the expense of grasses.

Managers at the Park recognized the effects of fire exclusion and fire suppression in the late 1970s (NPS 2005). They also recognized that carefully placed fires could reduce accumulated fuels around valuable cultural and natural resources and help protect them from wildfire. Since 1979, the Park has implemented 40 prescribed fires covering approximately 7,600 acres of land. Since 1993, 15 lightning ignited fires in the Park have met the criteria for WFURB had have burned a total of 4.5 acres (NPS 2005).

Between January 1960 and December 2004 seven MSOs were incidentally observed within the Park. These observations and others in adjacent areas indicate that MSOs inhabit steep-walled canyons and mature forested locations in and adjacent to the action area (National Park Service 1990, 1990a, USDI Fish and Wildlife Service 1992, Patton 2004, NPS 2005a). Although suitable habitat is believed to be present in the Park, MSO surveys have not been conducted and PACs have not been designated. To estimate the location, quality, and quantity of potentially suitable MSO habitat in the Park, we recommended that the NPS use Geographic Information Systems (GIS) to model potential MSO habitat. According to the model, there are about 630 acres that have a high potential of containing suitable and/or occupied MSO habitat within the Park (NPS 2005b). The Park also modeled 5,180 acres that have a moderate and 7,860 acres that have a low potential MSO habitat (NPS 2005b). Because MSO surveys have not been conducted, this GIS model is the best information we have concerning the potential of MSO habitat occurring within the Park. Based on the results of this model, MSO occupancy data from the adjacent Guadalupe Ranger District lands, and our knowledge of the MSO, we believe that MSOs likely inhabit and breed within the Park. For this reason, we assume that MSOs are present and breeding within the Park. For this BO, we have termed the high to moderate potential habitat as unsurveyed potentially occupied MSO habitat.

Currently, there are a total of 134 MSO PACs on the adjacent Lincoln National Forest. The majority of these PACs are located on the Sacramento Ranger District; however, the Smokey Bear and Guadalupe Ranger Districts share the remaining 25. Beginning in 1994, the Guadalupe Mountains Ranger District has conducted numerous surveys throughout the potential MSO habitat on the southern end of the District (Forest Service 2003a, 2004). They have designated 10 PACs on the District. Five of these PACs have the potential to be affected by the proposed action. Additionally, there are likely thousands of acres of protected (e.g., steep slope) and restricted habitat within the potentially affected area of the Guadalupe Mountains Ranger District. Within this area, MSOs are generally found roosting and nesting within caves located in canyon-bound habitat (Forest Service 2003a, 2003b). The vegetation is primarily composed of desert shrubs, cactus, shrub-like oak (*Quercus* spp.), pinon pine (*Pinus edulis*), and juniper (*Juniperus* spp.) (Forest Service 2003b).

Other past and present projects that may contribute to the environmental baseline within this RU

and that may affect the MSO include: Wildland Urban Interface Projects on Forest Service lands (Service 2001c), livestock grazing, the Forest Service's Rio Penasco II vegetation management project (Service 2002, 2005), recreational activities, recreation and scenic vista developments, road construction, maintenance activities, land exchanges, right-of-way issuances, power line construction, and catastrophic wildfires, their suppression and rehabilitation activities. As noted, the risk of catastrophic habitat loss due to fire is extremely high in the Guadalupe Mountains. Past fires have modified thousands of acres of suitable MSO habitat and likely impacted multiple MSO territories.

Since the MSO was listed, we have completed or have in draft form a total of 148 formal consultations for the MSO. These formal consultations have identified incidences of anticipated incidental take of MSO in 338 PACs. The form of this incidental take is almost entirely harm or harassment. These consultations have primarily dealt with actions proposed by the Forest Service, Region 3. However, in addition to actions proposed by the Forest Service, Region 3, we have also reviewed the impacts of actions proposed by the Bureau of Indian Affairs, Department of Defense (including Air Force, Army, and Navy), Department of Energy, NPS, and Federal Highway Administration. These proposals have included timber sales, road construction, fire/ecosystem management projects (including prescribed natural and management ignited fires), livestock grazing, recreation activities, utility corridors, military and sightseeing overflights, and other activities. Only one of these projects (release of site-specific MSO location information) has resulted in a BO that the proposed action would likely jeopardize the continued existence of the MSO.

In 1996, the Service issued a BO on Forest Service Region 3's adoption of the Recovery Plan recommendations through an amendment of their Forest Plans. In this non-jeopardy BO, we anticipated that approximately 151 PACs would be affected by activities that would result in incidental take of MSOs. In addition, we completed a reinitiation of the 1996 Forest Plan Amendments BO which anticipated the additional incidental take of five MSO PACs in Region 3 due to the rate of implementation of the grazing standards and guidelines, for a total of 156 PACs. To date, consultation on individual actions under the amended Forest Plans have resulted in 233 PACs adversely affected, with 49 of those in the Basin and Range East RU Region 3 of the Forest Service reinitiated consultation on the Forest Plans on April 8, 2004.

Sneed and Lee pincushion cacti

As noted, this BO analyzes the impact of the proposed action on both Sneed pincushion and Lee pincushion cacti based on similarity of habitat, taxonomic uncertainties, and difficulties in field identification. The distribution of the Lee and Sneed pincushion cacti in the Park was estimated through surveys conducted in 1984 that mapped the locations and identified habitat (NPS 2005a). The Park also developed a habitat-based model for these cacti as part of this consultation. The model included the following parameters: 1) elevations between 3,900 and 4,900 feet; 2) Tansil, Yates, and Seven Rivers limestone formations; and 3) north-facing exposures. Using the model, the Park estimates that about 12,125 acres of cacti habitat are present (NPS 2005a). The 1986 Recovery Plan for Sneed pincushion and Lee pincushion cacti estimated between 1,000 to 2,000

individuals may be present within the Park boundaries (USDI Fish and Wildlife Service 1986). Observations and park data indicate this number may be an order of magnitude higher; the BA estimated more than 100,000 pincushion cacti are likely present within the Park (NPS 2005a). The limestone formations where these cacti grow support perennial bunch grasses and a wide variety of shrubs and cacti (Heil and Brack 1985). Currently, we believe the Lee and Sneed pincushion cacti are unevenly distributed within the Park. For example, these cacti occur within defined localities of up to several hundred acres, with several hundred to several thousands of plants at each locality (NISC 1998). Although the Lee pincushion cactus is presently found only within the boundary of the Park, suitable habitat for it occurs along the length of the Guadalupe Rim. As such the range of this taxon could extend into Otero County, New Mexico. It could also extend onto lands managed by the Roswell District of the BLM, and the Guadalupe Mountains Ranger District of the Lincoln National Forest (Forest Service 2003a). To date none of the pertinent literature or known authorities have cited any records of this species outside of the Park; however, the distribution of the Lee pincushion cactus is not fully understood (NISC 1998, Forest Service 2003a). Alternatively, the Sneed pincushion cactus is known to be present within the Guadalupe Mountains Ranger District (Forest Service 2003a).

The National Park Service has studied the effects of fire on the Lee pincushion cactus (Stubbs 1998). Monitoring of this fire found that the majority of Lee pincushion cacti (41 of 67 plants) within the fire's perimeter were unaffected because of the patchiness of the fire from the rocky substrate (NPS 1996). Of the 26 cacti exposed to fire, 7 died (NPS 1996), indicating that about 10 percent of the Lee pincushion cacti died when they were exposed to fire. However, natural mortality was accounted for, and likely confounded the results (NPS 1996, Stubbs 1998). Still, observations indicated that this cactus is tolerant of low-intensity fire, probably due to its normal habitat of flat, exposed, rocky shelves generally devoid of most other fuels (Mulligan and Route 1996). Alternatively, Stubbs (1998) observed about 90 percent mortality of Lee pincushion and similar cacti in some areas of the Park after a high-intensity fire in 1990.

At the recommendation of the Service, two park monitoring studies conducted on Lee pincushion cactus evaluated mortality of the species following fire. In both studies, some of the cacti either perished immediately or suffered fire-caused injuries that resulted in mortality over the three years of data collection. Causes of mortality were from the direct exposure to heat and flame, retention of heat in surrounding vegetation, and burning vegetation rolling down slope onto and near individual cacti (NPS 2005a). Nevertheless, the Park monitored the Lee pincushion cactus in 2004 and determined its population to be stable (NPS 2004).

The EA also mentioned that there is potential for trampling plants by wild ungulates in known and unknown occupied habitat. Impacts that affect the status of a species are described within the Environmental Baseline of section 7 consultations, but are not part of our effects analysis. Therefore, these "acts of nature" are not discretionary actions related to the proposed FMP.

EFFECTS OF THE ACTION

Mexican spotted owl

Restoring fire, a natural disturbance process, to its historic role at the Park is one of the Park's highest management priorities (NPS 2005). The proposed FMP seeks to safely and effectively manage WFURB and prescribed fires, while providing for the protection of life, property, and the Park's natural and cultural resources. The proposed FMP is based on the adaptive management concept and therefore implements deliberate and measurable actions that are monitored to determine if the conditions produced are favorable, sustainable, and maintain or improve ecosystem health.

With the arrival of Euro-Americans into the area, the patterns of fire changed dramatically, mostly from grazing and intense fire suppression activities in the 20th century. Some forest habitats have become denser, and more prone to high-severity, stand-replacing fires. An assessment of forest structure at the Park shows that the absence of frequent, low-intensity fire has altered and degraded the Park's forests in many ways. For example, within the coniferous forest habitat type, there is a high stocking density of small trees (<3 in dbh) and ladder fuels. Recent insect damage is also apparent in Douglas-fir and ponderosa pine, while quaking aspen is diminishing. These current forest conditions, have created the opportunity for the high intensity, high severity, stand replacing and stand destroying fires. Therefore, active management is needed to reduce the threat of catastrophic wildfire, while ensuring that adequate MSO habitat will exist into the future (USDI Fish and Wildlife Service 1995).

Nevertheless, the application of fire should be used carefully in MSO habitat (USDI Fish and Wildlife Service 1995). Fire is one of the most rapidly acting of natural disturbances. After a large crown fire, components of MSO nesting, roosting, and foraging habitat can be reduced or eliminated. Small-scale managed burns (i.e., WFURB and prescribed fires), however, have the potential to reduce fuel loadings and create small openings and thinned stands that increase horizontal diversity and reduce the risk of catastrophic fire. Small-scale fires and lightning strikes also create snags, canopy gaps, and large downed logs, plus they perpetuate understory shrubs, grasses, and forbs which are important habitat components to the MSO and its prey (Moir et al. 1995).

Fires have played an important role in the composition and structure of conifer forests. Generally, historic natural fires in ponderosa pine were light in intensity depending on fuel loadings and weather conditions. This created a situation whereby some areas did not burn, some areas burned intensely with crown fires, and most areas burned lightly leaving large fire resistant trees, killing shrub top growth, and removing dead fuels (Wright and Bailey 1982). In mixed conifer forests, historic fires often were composed of intense, crown-replacement in small patches. Prescribed fires and WFURB may be expected to alter mixed conifer habitats of the MSO in the short-term to a greater extent now than historically because the fuel accumulations that are characteristic of many MSO nest and roost sites generally place them at higher fire risk. This is particularly true in the project area, as fire has been excluded for many years, and fuel loadings are high and continuous within some areas of MSO habitat. In addition, grazing historically occurred in the action area, thereby reducing fine fuels (grasses and forbs) necessary for re-current, low intensity fires, potentially assisting in the establishment of high numbers of

tree saplings and encouraging the establishment of shade-tolerant and fire-sensitive species (Belsky and Blumenthal 1997).

Injury to ponderosa pine from ground fires is generally confined to scorch of bark and lower branches because the thick bark of this tree insulates the cambium (Patton and Gordon 1995). Bradley et al. (1992) indicates that ponderosa pine trees that are heavily infected by the dwarf mistletoe (*Arceuthobium campylopodum*) are more susceptible to fire-related mortality and crown scorch than uninfected or moderately infected trees. On moist sites, ponderosa pine often forms two-storied stands that may be quite susceptible to crown fire. The tendency for regeneration of ponderosa pine to form dense understories, or "dog-hair" thickets, on such sites creates fuel ladders that can carry surface fires to the crowns of overstory trees (Bradley et al. 1992). The thinning effect of fire is therefore much more pronounced in dense stands than it is in more open and mature stands. Heavy accumulations of litter at the base of pole and saw-timber-sized ponderosa pine can increase the severity and duration of fire.

Mature Douglas fir has relatively high resistance to fire damage. Saplings and small pole-sized trees of this species, however, are vulnerable to surface fires because of their thin bark (Bradley et al. 1992). Douglas fir occurs in open stands, but it also grows in dense stands with continuous understory fuels. Dense sapling and thickets of pole-sized trees can form an almost continuous layer of flammable foliage 10-26 feet above the ground that will support wind-driven crown fires. Crowning and "torching" of individual Douglas fir is also aided by the presence of large, dense witches'-brooms caused by the dwarf mistletoe. As with ponderosa pine, heavy fuel accumulations at the base of Douglas fir increases the probability of fire injury. Heavy litter accumulations may allow injury to tree roots, causing delayed mortality and often resulting in sterilization of soils (Bradley et al. 1992).

Although the objectives of the Park's FMP are generally consistent with the MSO Recovery Plan's conceptual framework and principles, two notable exceptions to the Recovery Plan are: 1) because surveys have not been conducted and no PACs are currently designated there are no 100-acre core acres that are deferred from treatments; and 2) prescribed burns may take place during the MSO breeding season. As described below, implementation of the proposed FMP would treat much of the unsurveyed potentially occupied MSO habitat over the next ten years. For example, the Park contains small pockets of coniferous forests and woodlands and other areas (e.g., canyons) that likely contain MSOs. The majority of the MSO habitat is likely located within the western wilderness area of the Park within the wildland fire use study zone and north boundary prescribed fire study zone. However, without MSO surveys, we cannot rule out that MSOs may be breeding within other treatment zones.

The MSO Recovery Plan (USDI Fish and Wildlife Service 1995) recognizes catastrophic fire as the greatest threat to MSO habitat. WFURB and prescribed fires are extremely important management tools needed to enhance, and often to restore many of the ecosystem functions and processes. Reduction in habitat and various habitat-based threats have contributed to the listing of the MSO. The long-term benefits to the MSO of many land management actions may contribute, in the short-term, to certain adverse effects to the MSO, WFURB and prescribed fire

projects often fall into this category. Species such as the MSO, whose habitats have been reduced, degraded, or altered, may currently respond to fire differently than they did historically when fire occurred in a more natural setting. As noted, the Recovery Plan (USDI Fish and Wildlife Service 1995) encourages fire management programs which take an active role in fuels management and understand the ecological role of fire. Therefore, fire plays the dual role of being both potentially beneficial and catastrophic to the MSO and its habitat.

The guidance from the Recovery Plan that is specific to prescribed fire and WFURB includes:

1. Within each PAC designate 100 acres centered on the nest site. These 100 acres will be deferred from treatments described below;

2. Within the remaining 500 acres of the PAC, combinations of thinning trees less than 9 inches dbh, treatment of fuels, and prescribed fire can be used to reduce fire hazard and improve MSO prey habitat. Large logs (greater than 12 inches midpoint diameter), grasses, forbs, and shrubs should be retained or enhanced. Emphasis of the spatial configuration should mimic natural mosaic patterns;

3. Within PACs, treatments can only occur during the non-breeding season (1 September to 28 February);

4. Following treatments within PACs, effects to MSO, prey species, and their habitats should be assessed;

5. Within steep slopes (i.e., greater than 40 percent) that are considered protected habitat, thinning of trees less than 9 inches dbh, treatment of fuels, and prescribed fires and WFURB are allowed. No breeding season restrictions apply;

6. Within wilderness research areas that are considered protected habitat, encourage the use of WFURB. No breeding season restrictions apply;

7. Within restricted habitat, the use of prescribed fires and WFURB is strongly encouraged to reduce hazardous fuel accumulations. No breeding season restrictions apply; and

8. Within other forest and woodland types, proactive fuels management is encouraged. No breeding season restrictions apply.

The Recovery Plan (USDI Fish and Wildlife Service 1995) encourages the use of prescribed fires, but is unclear on guidance for WFURB. For this reason, the Service issued a policy memorandum in 1997 to describe guidelines for WFURB (prescribed natural fire) (USDI Fish and Wildlife 1997). This guidance includes:

1. MSO surveys are encouraged, but are not required for WFURB areas.

2. The following relate to areas containing MSO habitat that have not been completely surveyed:

a. protection of the 100-acre PAC center is not required as long as the agency coordinates fire management plans with local biologists;

b. known PAC locations and the associated 100-acre core areas must be incorporated into the FMP;

c. the FMP must identify areas that should be managed conservatively; and

d. FMPs must contain sufficient detail to evaluate the potential effects to MSOs during section 7 consultation.

3.There is no breeding season restriction for WFURB.

The potential for effects to MSO to occur depends largely upon the specific type of fire activity and its location, within or in proximity to MSO habitat, or the timing, duration, and breadth of the action. Our understanding is that administrative and other resource constraints (e.g., "Go, No-Go Run Sheet") will generally limit the effects of fires on MSO habitat. We anticipate that fires will consume some downed logs, snags, shrubs, and other understory vegetation, but prescriptions would likely provide protective measures to reduce some, but not all adverse impacts. Some of the anticipated effects are: 1) charred bark up to ten feet from the ground; 2) needles and leaves may be scorched in the lower branches (usually those less than 20 feet from the ground); and 3) smaller trees occupying the understory may be lost, especially when dead fuels have accumulated at their base and/or are already susceptible due to old scars. Fire activity from managed burns may range from creeping surface fires of less than one foot in pine litter and duff to an active surface fire which could actively torch groups of seedling and small pole-sized trees (e.g., 1 to 4 inch dbh). It is also possible that overstory tree canopy cover and understory ladder fuels would be broken and patchy, effectively mitigating opportunities for continuous crown fire runs, while allowing limited torching of canopy patches.

Fire prescriptions in MSO habitat would likely generate low to moderate-intensity surface fires. MSOs located in mature overstory trees and in cliff nests would not be directly threatened by flames, although they could be affected temporarily by smoke. Roosting adults could easily move away from fire activity, and the risk of being killed by flames or asphyxiation would be small. The habitat conditions typical of some areas of MSO habitat in Park would promote controlled, low intensity burns and would lessen the fuel loads. Nevertheless, adverse impacts to MSO habitat may include the possible destruction of nesting and/or roosting habitat from prescribed fires or WFURB escaping prescription and becoming a wildfire. Prescribed fire intensities will likely be designed to maintain the midstory and overstory canopy stand structure and to break up the continuity of fuels in MSO habitat. Ignition of prescribed fire will likely be designed to reduce ground and ladder fuels within 3 m (10 ft) of the ground, while minimizing forest structural changes above that level. Fire variability and the dampening effects of cool,

moist microclimate in favorable situations are expected to maintain or even enhance some of the key components of MSO habitat. The implementation of WFURB and prescribed fires should result in cool, low intensity burns within MSO habitat that will mimic natural mosaics. High intensity burns should not occur within MSO habitat or will be small scale (e.g., less than a few acres).

The National Park Service will plan WFURB and prescribed fires in accordance with their wildfire management planning and implementation process described in Directors Order 18 and Reference Manual-18 (National Park Service 1999, 2003). These documents provide internal requirements that the National Park Service will follow to plan and evaluate their WFURB and prescribed fire programs. For example, a prescribed fire project plan will include a description of structure and composition of vegetation types within the project area, fuels characteristics (e.g., fuel loadings, fuel bed depth, and fuel type), identifying and controlling risks to protect resources and property (i.e., risk management), and preburn considerations such as timeframes, special features to be protected, and monitoring needs (National Park Service 1999, 2003, 2003a).

We recently developed policy to adapt a long-term view of the benefits of fuels treatment projects (USDI Fish and Wildlife Service 2002). Some projects, such as the current FMP, may have short-term adverse impacts on the MSO, but at the same time present opportunities for significant long-term benefits. Surveys for the MSO have not been conducted on the Park and modeling data of potential MSO habitat indicates that a significant part of the Park's 4 out of 5 treatment units may provide MSO habitat (NPS 2005b). Based on our review of the BA and EA, about 13,670 acres of unsurveyed potentially occupied MSO habitat in the Park could be affected by the action.

The conservation measures specifically will limit potential adverse impacts to the MSO and its habitat because the FMP will incorporate, and the National Park Service will follow these measures. For example, we assume that as surveys are conducted and PACs are designated, this information will be incorporated by the Park as they develop and implement the overarching FMP and individual prescribed fire plans. The Service stresses the need to view MSO data as an essential piece of information managing the fire program at the Park. Prescriptions will be tailored to maintain key structural features of MSO and small prey habitat. As the burn plans are implemented, we assume these prescriptions will be tested and adaptively managed.

The conservation measures detailed under the proposed action section above represent actions proposed by the National Park Service that were evaluated as part of the jeopardy and the incidental take analyses. The conservation measures promote management of forested habitat so that important and difficult to replace MSO habitat is conserved. Additionally, the measures will assist in reducing habitat simplification (i.e., key habitat components will be retained without impeding the objective of reducing fire hazard), and are intended to protect the best available MSO habitat, while minimizing adverse impacts to the MSO. All of the measures will directly lessen the impacts from habitat altering activities on prey species and disturbance related impacts on the MSO.

MSO Habitat

Due to decades of fire suppression within the project area, excessive fuels have become the primary carrier of fire and are likely the causal agent for the extreme fire hazard. For these reasons, management of this habitat component is difficult. For example, the intent of the fuel reduction treatments proposed is to remove as much small and medium-sized dead and down fuel as possible while retaining an acceptable level of large woody debris. As noted previously, we assume that burning within and around unsurveyed potentially occupied MSO habitat will generally follow the guidance in the Recovery Plan and also be dictated by the National Park Service's conservative prescriptions other administrative controls, and will use adaptive management. This will assist in the control of these fire events ensuring that, while some dead and down material will be lost, adequate levels will be retained and/or generated by tree mortality while still meeting the desired objectives of treatments. Therefore, we expect that these important habitat components will be retained or replaced throughout MSO habitat.

However, it cannot be ruled-out that instances may occur where loss of the dead and down components reaches a level in a given area that may adversely affect the MSO. The National Park Service expects that such an effect would be very short-term as replacement material (tree mortality from bark beetle and burns, etc.) will be readily available to again bolster this habitat component to acceptable levels in these circumstances. Although short-term adverse affects to MSO habitat may occur, we believe these will be temporary and not likely to cover a significant portion of the action area. Similar to the proposed non-fire treatments, we expect that WFURB and prescribed burning will provide conditions suitable for increased herbaceous plant growth by removing dead plant debris within treated areas. The mosaic effect created by burned and unburned areas is expected to increase herbaceous plant species diversity and, in turn, assist in the production and maintenance of the MSO prey base. In addition, proposed treatments are expected to favor larger conifers and oaks which supply a large amount of forage in the way of seeds, buds, acorns, etc.

The Recovery Plan (USDI Fish and Wildlife Service 1995) recognizes that prescribed natural fire (i.e., WFURB) may be beneficial to MSO habitat in several ways: 1) it can aid in reducing fuel loads and the risk of catastrophic wildfire which may result in the loss of habitat over large areas; 2) it can create a diverse landscape with considerable horizontal heterogeneity which seems to be relatively characteristic of many areas occupied by MSOs and also provides for a diverse prey base; and 3) it can create conditions that maintain shade-intolerant species such as ponderosa pine or Gambel oak in the landscape.

We believe that WFURB and prescribed fires that burn within prescription are not expected to significantly alter canopy closure inside or outside of unsurveyed potentially occupied or other MSO habitat. These burns will likely target dead and live fuels near the forest floor, including dead and down material, live brush and, in some cases, "dog-hair" thickets of conifer. Generally, these activities will not affect canopy closure, but will reduce the amount of surface and ladder fuels. Therefore, we believe that the successful implementation of the FMP will assist in

reducing the existing threat of catastrophic wildfire.

The Recovery Plan takes a conservative approach to prescribed fires within PACs, recommending that the 100-acre core area not be burned at any time, and that PACs not be burned during the breeding season. Alternatively, the WFURB policy guidance is much less restrictive in its approach and allows burning without a breeding season restriction. While acknowledging that MSO may be incidentally taken, the Recovery Plan indicates that such trade-offs are necessary to return fire to the fire-adapted ecosystem in which the MSO evolved (USDI Fish and Wildlife Service 1995).

If managed burns occur during the MSO breeding season, MSO breeding and/or foraging within the Park may be affected. Light fire that passes through the understory of a nest-roost stand likely will have no adverse effects on MSOs, as long as reproducing MSOs are not present and key habitat components are retained. Alternatively, burning in close proximity to an active MSO nest has the potential to result in the direct or indirect death of adult and young MSO due to loss of nest/roost trees caused by individual or groups of trees crowning or by intense heat generated within steep canyons. This is especially true during May through July when young are unable to fly. Burning within the core areas of unsurveyed potentially occupied MSO habitat, regardless of the time of year, will result in short-term adverse effects of burning to the MSOs and their habitat. Depending on the severity and spatial configuration of the burn (e.g., whether MSO core areas are burned or habitat components are retained within MSO nest or roost habitat), these effects could range from simply being flushed from a roost or nest to abandonment of the nest and nestlings. We anticipate that burning within the breeding season and within MSO core areas have the potential to harass or harm MSOs. We find that effects could occur through loss of prey habitat or disturbance to nesting MSOs (adults or nestlings).

It may be possible that low-intensity fires benefit MSOs although we are unaware of any definitive scientific evidence to support this conclusion. Bond et al. (2002) examined the short-term effects of wildfires on all three subspecies of spotted owls. They determined that spotted owls exhibited high estimates of post-fire survival, site fidelity, and average number of fledglings per pair, one year after both low and high severity fires. Unfortunately, their study describes only very short-term results, and was not designed to address the long-term effects of wildfires on spotted owls. Furthermore, although they indicated that only four of the eight territories that were examined for fire severity were subjected to high-severity fire, the results from low severity fires and high severity fires were not distinguished in the study. Thus, it is not possible to determine from the reported results whether the examined life history components were differentially affected by low and high severity fires. However, they were able to "hypothesize that spotted owls may have the ability to withstand the immediate, short-term (1-year) effects of fire occurring at primarily low to moderate severities within their territory." Although a similar hypothesis was not expressed for high severity fires, the researchers stated that "the spotted owl may be able to survive wildfires of various sizes and severities." These conclusions are similar to Jenness (2000) that found the presence of a fire in MSO territory did not appear to play a significant role in whether a MSO would be present or reproduce. Stacey and Hodgson (unpubl. manuscript) also reported that effects from a fire that burned in a highly

patchy manner (i.e., considerable roosting and foraging habitat remained after the fire) appeared to have little direct impact on MSO.

Bond et al. (2002) also stated that while they do not yet advocate wholesale prescribed burning in MSO territories, they do believe that their observations justify large-scale experiments to corroborate their observations and to establish cause-and-effect relationships. While the proposed action does not include an experimental approach, the National Park Service's required monitoring process can potentially contribute to the body of knowledge on the effects of fire to MSOs.

WFURB or prescribed fire may create small openings in the canopy caused by single or groups of trees crowning. The Service believes the risk of trees crowning is more probable in MSO nesting/roosting habitat. The location of quality MSO habitat often corresponds to characteristics that put these sites at higher risk of crowning such as dense, multi-layered canopies, the presence of mistletoe "brooms" and high fuel loadings resulting from high densities of down logs. The loss of some of the lower branches in the canopy may have some effect on MSO foraging. MSO utilize the "perch and pounce" method of hunting, using the lower branches of trees for perching. The loss of some perching sites when burning within prescription is not expected to significantly affect the ability of MSO to forage successfully. If low-intensity fires can retain the characteristics recommended by the Recovery Plan, then anticipated adverse effects to MSO habitat are likely to be few, and may in fact be beneficial.

Burning is expected to result in the loss of some snags and the creation of others; particularly smaller snags. Following burning prescriptions will facilitate control and allow for a high snag basal area to persist. Therefore, we expect that any loss to snags within a treatment area will be insignificant and discountable. It is also important to note that many MSO within the Park and adjacent public lands forage and nest within steep canyons, which will burn differently than forest habitat. For example, burn plans may frequently use natural barriers such as steep canyons or talus slopes as holding areas (fire perimeters) because these areas create excellent natural barriers where fuel loadings are lower, spot fires will likely burn out, or fire may not be carried at all.

The random nature of lightning does not allow for predicting where, when, or how many WFURB may occur in the project area. It is expected that the vast majority of lightning that may result in a WFURB will likely occur during the summer months. If a lightning-started fire falls within prescription parameters, it may be managed to meet resource objectives. Otherwise, the fire will be suppressed as rapidly as possible. We find that this process will generally avoid and/or minimize impacts to the MSO.

It is our understanding that the forthcoming FMP will use the modeled MSO habitat in the management of fire throughout the Park (i.e., WFURB, prescribed fire, and wildfire suppression). Moreover, we assume that the FMP will be updated regularly to incorporate new MSO and other relevant natural resource information. For example, each prescribed fire project plan will survey, identify, and consider MSO PACs and other MSO habitat prior to ignition.

This information in conjunction with the fire prescriptions and pre-burn considerations (e.g., risk management of identifying and controlling hazards to protect resources and property) will ensure that these areas are managed conservatively (e.g., see USDI Fish and Wildlife Service 1995). This aspect of the current proposed action follows the recommendations of the Recovery Plan and should limit adverse affects to the MSO and its habitat.

Prey Habitat

The effects of fire include both negative and beneficial effects on MSO habitat. Beneficial aspects would include increased response of herbaceous vegetation after a fire. Negative effects would include the loss of MSO prey habitat components such as herbaceous cover, down logs and snags. The effects of fire on the prey base of the MSO are complex and are dependent on the variations in fire characteristics and in prey habitat. Fire intensity, size, and behavior are influenced by numerous factors such as vegetation type, moisture, fuel loads, weather, season, and topography.

It is suspected that the effects of intense stand-replacing wildfires that dramatically alter forest structure and move the system to earlier seral stages would have longer-term effects on some rodent populations. Likely, early successional species, such as deer mice, and those that require open habitat with a well-developed herbaceous understory, such as microtine voles and pocket gophers, would benefit. In contrast, species that require a wooded or forested overstory would exhibit population declines. The net effect of such fires on the MSO is unclear: a fire that removes the tree canopy would likely render a portion of the area unusable for foraging by MSO; but if the spatial extent of crown loss is limited, a mosaic is created that could provide a diversity of prey for the MSO and actually be beneficial (Ward and Block 1995). Additionally, much of the MSO habitat within the Park and adjacent lands is composed of steep canyons, where prey use may differ from other regions (Forest Service 2003a). Because MSO prey species evolved in ecosystems where fire was a natural process, we assume that historically, these species survived, and some even benefited from the occurrence of fire. Nonetheless, effects of fire on small mammals under present environmental conditions are unclear (Ward and Block 1995). The current project may assist in filling some of these data.

WFURB and prescribed fires conducted within prescription are likely to have immediate short-term effects to MSO prey habitat. Although fire may enhance vegetative density and abundance in the long-term, short-term effects of burning, particularly in the spring and early summer when herbaceous vegetation is most critical for reproducing rodents, may limit available forage immediately after the fire event. Most WFURB will likely occur during May through August, when the rodents would be most affected by habitat loss. The National Park Service did not identify when prescribed burns will be ignited. However, it is likely that some prescribed burns will occur in early spring (e.g., March or April) when burns can be conducted within prescription. Thus, either type of managed fire may occur during the MSO breeding season. Nesting MSO would be most affected during this time as they would require a consistent supply of prey to successfully fledge young. We believe that prescribed or WFURB that occurs within MSO habitat during the breeding season, and within the core areas of unsurveyed potentially

occupied MSO habitat at any time, may adversely affect the MSO by limiting available prey.

Long-term Benefits of WFURB and Prescribed Fires

Reintroducing fire into the ecosystem could have many benefits. Among these are the reduction of woody fuels which would decrease the possibility of intense, stand-replacing fires and resulting erosion, soil sterilization, and increased plant mortality. Ultimately, if fire continues to be excluded from the system, a major wildfire will occur with potentially devastating effects to the MSO and its habitat. Historic low-intensity fires that removed small trees and ground fuels, but rarely killed mature trees, occurred at frequent intervals. Implementing the proposed action would reduce fuels and hopefully begin to restore a natural fire regime in which frequent, low-intensity fire would act to maintain a mosaic of fuel loads across the area.

We expect that forest health conditions will improve under the current proposed action, because WFURB and prescribed fires will be applied across the landscape and should result in management activities that will minimize adverse impacts to the MSO by maintaining and restoring healthy forest conditions. Bond et al. (2002) hypothesized that spotted owls may withstand the immediate, short-term (1-year) effects of fire occurring at primarily low to moderate severities within their territory. The Forest Service (2003) also reported similar results following the 2002 Lakes Fire in the Jemez Mountains, New Mexico. Under current fuel loads, if a fire were to erupt within the proposed project area, the event could likely be catastrophic. Failure to address the threat of fire by reducing fuel levels will inevitably lead to more and larger fires that result in the continual loss of the MSO and its habitat. Still, we find that the proposed fire-related activities have the potential to result in adverse effects to MSOs in the short term.

Monitoring and Adaptive Management

The FMP and subsequent short and long-term fire effects monitoring program will be collecting information to assess accomplishments and determine effects of management activities on cultural and natural resources (Wildland Fire Management Reference Manual 18, 2002). Pre- and post-burn monitoring will evaluate if project objectives were met. This monitoring will also result in digital data, including GIS-compatible data. For example, all fires greater than 100 acres will be mapped using GIS (Wildland Fire Management Reference Manual 18, 2002). These efforts will provide information useful for guiding future forest/fuels management projects, assessing potential impacts to MSO habitat and prey, and will be useful information for recovery of the species (USDI Fish and Wildlife Service 1995).

The Service believes that the proposed FMP should be viewed as a working document, and should be subject to constant evaluation and modification if and when needed, based on the results of each year's burning and monitoring and MSO surveys that the National Park Service will conduct. Applying new information to land management decisions as it is developed is an important aspect of adaptive management and will result in benefits to the MSO by incorporating this information in the recovery planning process. Much of the discussion above addresses appropriate use of low-intensity WFURB or prescribed fires in MSO habitat and the benefits and

potential impacts thereof.

Non-burning treatments

The National Park Service indicated that the proposed action will generally follow the recommendations identified in the Recovery Plan (USDI Fish and Wildlife Service 1995). For example, thinning within unsurveyed potentially occupied MSO habitat will conform to those recommended in the Recovery Plan. Mechanical thinning within unsurveyed potentially occupied MSO protected habitat would remove understory trees less than 9 in dbh. These types of treatments would remove fine fuels from below, but would only slightly reduce the basal area and canopy closure. If the National Park Service follows the spirit and intent of the Recovery Plan when applying these prescriptions, the outcome would likely leave a relatively dense over-story, but reduce the risk of habitat loss by wildfire. This will provide for the high canopy cover component preferred and used by the MSO for nesting and roosting.

Moreover, any canopy cover lost from mechanical thinning would be short-term, because crown densities on the remaining trees would increase from reduced competition. Snags are a key habitat component that could be affected by mechanical thinning. Because the National Park Service has indicated that they will follow the Recovery Plan, all snags that do not pose a threat to life or property will be retained. We conclude that non-burning prescriptions (e.g., mechanical or manual thinning) meet the spirit and intent of fire abatement program described in the Recovery Plan. Therefore, the proposed thinning activities will not be adverse or result in take, but will result in long-term benefits to the MSO (USDI Fish and Wildlife Service 1995).

Noise and visual disturbance

The activities associated with managing a prescribed fire involve igniting and monitoring the fire's progress. After monitoring weather conditions and insuring that proper fuel moisture and wind patterns exist, firefighters will ignite the perimeter of the project area using standard hand ignition practices. The perimeter will likely be divided into sections and lit in a controlled manner. Once a defensible perimeter is established, the interior of the project area will be lit. Large patches of unburned areas within the perimeter may be re-ignited using drip torches or other hand ignition techniques. Similar to WFURB, while a prescribed fire is burning, small numbers of personnel will monitor the area recording the fire's growth and behavior. In some cases, it also becomes necessary to use suppression techniques to manage the fire. These can range from small efforts such as putting in a fireline around a cultural resource site to suppressing one flank of a fire while allowing the other to grow. It is also possible that the fire could exceed the prescription and cease to be a low-intensity ground fire, or could threaten the pre-established project boundaries, in which case full scale suppression activities will be undertaken. These activities could result in increased levels of disturbance to MSO from personnel on the ground and from aircraft.

Disturbance to the MSO may also be caused by human activities within or adjacent to unsurveyed potentially occupied MSO habitat during WFURB, prescribed fires, or wildfire

suppression. Disturbance may be caused by fire resource personnel digging fire lines with shovels and other hand tools, walking and igniting with drip torches if "burning out" is needed to control a WFURB, and monitoring fire conditions from the ground or air. In previous consultations conducted for forest-management projects, we have concluded that MSOs could be incidentally flushed if they are within the project area. When this proposed project is implemented, MSOs have the potential to be subjected to high levels of disturbance within unsurveyed potentially occupied MSO habitat. These potential effects may harass MSOs during the sensitive breeding season. While fire results in a change in stand conditions that persists into the future, the potential for disruption or stress to MSOs from the noise and activity associated with suppression or containment activities should be short-term and occur during the management of fires. We conclude that noise-related impacts from these activities may result in short duration of disturbance to MSOs.

WFURB or Prescribed Fire Burning Out of Prescription

Regardless of detailed planning and the use of the best fire science, there exists the possibility that a WFURB or prescribed fire may burn out of prescription and become a wildfire. The most likely reason for a WFURB or prescribed fire to go out of prescription would be a change in weather conditions such as wind speed or direction which would result in a subsequent change in fire behavior. The most devastating wildfire would be one that travels into the tree crowns and results in stand replacement over a large area. The results to the MSO of a WFURB or prescribed fire becoming a wildfire may include the direct loss of MSO, as well as loss of nest/roost habitat located in unsurveyed potentially occupied MSO habitat. If a wildfire occurs in such habitat during the breeding season, the fire may result in the loss of MSO nests as well as young MSOs who may not be able to fly to safety.

Wildfires that burn hot will result in the loss of MSO prey habitat such as down logs and unburned snags. In addition to the direct loss of MSO nest/roost habitat caused by a wildfire, effects to MSOs may also be caused by the actions taken to suppress the fire. These actions include back burning to contain the fire and prevent its further growth, the use of chainsaws and the cutting of trees, the use of retardant aircraft and the dropping of retardant, the use of helicopters and the dropping of water, and the presence of humans in unsurveyed potentially occupied MSO habitat. If a WFURB or prescribed fire results in a wildfire, the result could be harassment or harm to MSOs.

The variability of WFURB or prescribed fire effects and the unpredictable nature of weather, have the potential to result in effects to MSO. For example, it is possible that a WFURB or prescribed fire may burn out of prescription (i.e., resulting in a high intensity burn) or perhaps become a wildfire requiring suppression. Unsurveyed potentially occupied MSO habitat would be considered adversely affected by these management activities if the fire burns with such intensity or suppression activities occur within a unsurveyed potentially occupied MSO habitat that result in the loss of habitat components (USDI Fish and Wildlife Service 1995).

Emergency Consultation Related to Wildfire Suppression Activities

Although wildfire affects the environmental baseline of the MSO and is not an action subject to section 7 consultation, we do consult on activities to suppress the fire. However, the adverse affects of fire suppression are likely minor in comparison to high-intensity fires. During any emergency situation, our primary objective is to provide recommendations for minimizing adverse effects to listed species without impeding response efforts. Protecting human life and property should come first every time. Consequently, no constraints for protection of listed species or their critical habitat are recommended if they place human lives or structures (e.g., houses) in danger.

We have included and analyzed the effects from emergency wildfire suppression activities because the actions are covered within the FMP. The Park does not need to initiate consultation for individual wildfire suppression activities, but should continue to contact us when they determine listed species and/or critical habitat may be adversely affected. The National Park Service should never delay response to the emergency for this contact. The contact should be at your earliest possible convenience. Upon contact, we assume that the Park will provide us with as much detail as possible about the location and severity of the emergency. Subsequent calls to the Service will add or update information as appropriate. During these communications, and throughout the emergency response, the Service can provide recommendations that can be implemented to avoid or minimize impacts to listed species and their habitats. We have also included a list of discretionary conservation recommendations in Appendix A. The majority of these recommendations have been identified and used by other Parks as minimum impact suppression tactics (National Park Service 2004).

If the framework for fire suppression actions as described in this consultation cannot be applied during the suppression activities, the National Park Service will consult on an emergency basis after the fire on any activities that may have affected the listed species or habitat. If this framework is followed, the Park will report to the Service on the actions taken and effects to the species and its habitat following the emergency suppression of the wildfire, but no further consultation on that incident would be required.

Effects from Suppression Activities

Effects to MSOs may be caused by actions taken to suppress wildfires. Wildfire suppression may include a variety of actions including: 1) back-burning areas to contain the fire and prevent its further growth; 2) cutting of trees and snags; 3) the use of retardant drops within unsurveyed potentially occupied MSO habitat and nest stands; 4) aircraft overflights in unsurveyed potentially occupied MSO habitat; 5) the construction of hand and dozer lines through unsurveyed potentially occupied MSO habitat; or 6) other activities to contain and suppress the fire. Effects caused by the wildfire itself are not part of consultation. In most cases it is difficult to differentiate effects caused by wildfire and those caused by suppression actions. In addition, while it is probable that additional habitat damage would have resulted had suppression actions not been taken, it is impossible to assess what may have happened in the absence of suppression activities. Thus, the discussion that follows describes the effects that may result from an

emergency action. Many of these possible effects may also result in the absence of suppression activities and could, therefore, be attributed to a wildfire.

Similar to WFURB and prescribed fire, wildfire suppression can result in activities (e.g., digging fire lines, igniting vegetation, and monitoring fire conditions from the ground or air) that may cause disturbance to MSOs. Suppression activities that disturb habitat, such as back-burning, falling dangerous trees and/or snags that are potential fuels, clearing brush or downed fuels, and limbing or thinning trees to reduce ladder fuels can also affect the MSO. Bulldozer and hand-line construction or other habitat-disturbing activities can result in modification of MSO habitat. Use of bulldozers, chainsaws, and other equipment to remove fuels can also result in significant losses of key habitat components. Additionally, noise from air operations (e.g., helicopters), especially low-flying aircraft dropping water or retardant, can contribute to disturbance of MSOs. Back-burning in MSO habitat can result in loss of key habitat components, contribute to the general disturbance of MSO, and even result in the loss of individual MSOs. Alternatively, many of these impacts may be short-term or insignificant (e.g., see Bond et al. 2002; Jenness 2000; Stacey and Hodgson, unpubl. manuscript).

Although wildfire suppression activities are included in the proposed action and may be required, the effects of wildfire are unpredictable and difficult to analyze. Information gathered during or after emergency wildfire suppression or immediate rehabilitation activities may assist us in developing proactive recommendations for other resource agencies. We recognize that the Park Service's policy of minimum impact suppression activities as well as the incorporation of conservation measures into the proposed action will assist in minimizing adverse affects of suppression activities on MSOs (National Park Service 2005).

We believe it is important to note that current forest conditions create a high fire hazard. Without active fire management from WFURB or prescribed fire, suppression activities from future forest conditions would likely be much greater than those that may occur under the current proposal. We expect that forest conditions will improve throughout this project, lessening the overall risk of catastrophic wildfire to the MSO within the action area. Nevertheless, because of the unpredictable nature of wildfire, we anticipate that emergency suppression activities may result in harm or harassment of MSO. For these reasons, we strongly recommend that you respond appropriately to the emergency, and contact the Service at your earliest convenience. Because of the difficulty in projecting what impacts may occur to MSO from the wildfire suppression, the variety of outcomes are addressed in our incidental take statement.

Interrelated and Interdependent Actions

We also must consider the effects of interdependent and interrelated actions of this proposed project to the MSO. Interrelated actions are actions that are part of a larger action, and are dependent on the larger action for their justification. Interdependent actions are actions that have no independent utility apart from the action under consideration. The proposal includes fire management units on adjacent National Forest and BLM lands. The potential to manage or suppress fires on adjacent lands is considered interrelated and interdependent with the

implementation of the proposed project. The inclusion of adjacent lands makes the management of fire safer, cheaper, and more likely to mimic natural patterns. For example, if fire extends beyond the Park boundary, there are five MSO PACs and other MSO habitat within the Guadalupe Mountains Ranger District with a high potential to be affected. From these activities, we anticipate identical affects to MSO as described above. Therefore, we anticipate that MSOs may be taken within PACs as a result of fire management activities on adjacent public lands.

Indirect effects

Indirect effects are those that are caused by, or result from, the proposed action, and are later in time, but are reasonably certain to occur. Rehabilitation activities are indirect effects resulting from the implementation of the proposed action. We expect that rehabilitation activities will only be utilized after wildfires. It is our understanding that the National Park Service will follow the Department of Interior guidance on the use of burned area emergency rehabilitation activities (BAER) (National Park Service 1999). These rehabilitation activities are variable and reflect the unpredictable nature of wildfires. We anticipate that the National Park Service will coordinate BAER activities with the Service. It is our expectation that the majority of these actions will likely result in insignificant and discountable effects to the MSO.

Summary

Given the considerable degree of conservation measures incorporated into the National Park Service's proposed action, the general adherence to recommendations outlined in the MSO Recovery Plan, and the high likelihood that WFURB or prescribed fires will result in low to moderate intensity burns, we believe that many of effects to MSO within the action area will result in short-term adverse affects with long-term benefits to the MSO. We have identified those actions that may result in adverse affects or take for the MSO (e.g., burning during the breeding season and burning anytime within the core areas of unsurveyed potentially occupied MSO habitat). We also recognize that there is a small potential for either a WFURB or prescribed fire to burn out of prescription and result in a wildfire, which could also result adverse effects or take.

Sneed and Lee pincushion cacti

Succulents in general rarely actually burn, but spines may ignite and carry flames to the body of the plant (Forest Service 2005). The cactus body may scorch and blister without decomposing or being transformed by heat (i.e. pyrolysis), leaving undamaged parts of the plant alive. Mortality results from death of the photosynthetic tissue (Forest Service 2005). Cacti may appear completely scorched with no green tissue visible, yet may still survive fire. However, fire can cause delayed mortality, which may not occur for months or even years. Survival of succulents depends primarily on protection of the topmost portion or tip of the cactus. If the tip is undamaged from fire, the cactus will generally resume growth (Thomas 1991 cited in Forest Service 2005).

The number of individual cacti in the action area may exceed 100,000 plants (NPS 2005a). Both varieties of *Coryphantha sneedii* occur within areas that are at high risk of fire within the Park. We anticipate that implementation of the proposed FMP will result in mortality to both Lee and Sneed pincushion cacti. For example, previous fire monitoring within the Park has demonstrated that prescribed burns can kill individual cacti. Cacti within the boundaries of areas affected by WFURB and prescribed fires could be adversely affected if the removal of surrounding vegetation allows greater exposure to weather extremes. In addition, cacti could be injured or killed from construction of firebreaks and off-road activities associated with fire suppression. For these reasons along with our analysis of the previous fire monitoring, we do not expect that low to medium intensity burns will result in the death of more than 10 to 20 percent of these cacti (NPS 1996).

Prescribed fire preparation methods (blackline operations, firefighter off-trail movement, aerial incendiary devices, cultural resource protection actions) and wildland fire suppression methods (line construction, backburning, air tanker/helicopter water drops, water drop surfactants, fire-retardant drops, water tender use, cultural resource protection actions, firefighter off-trail movement) will directly affect any cacti in the area. It is unknown what fire intensity best reduces negative direct effects. However, in all likelihood, the higher the fire intensity, the greater the adverse effects due to increased direct mortality. Nevertheless, the limestone ridges and overall rockiness and irregular topography that defines suitable cactus habitat will limit the extent of most fires because these areas typically lack heavy accumulations of fuels.

Regular, low-intensity fire may help reduce cacti mortality from fires by reducing woody fuels that burn hotter than grasses. Both Sneed and Lee varieties flower in April and May, with fruit production in late summer. Although no data exist on impacts of fire during the fruit production season nor do data exist on the impacts of fire to fruits, WFURB or prescribed fires that ignite just before or during flowering season may affect reproduction (e.g., fruit set).

Previous attempts to protect these cacti using fire buffers have not been successful because of the distribution of these plants along the east-west limestone ridges that extend throughout the Park. As part of the proposed FMP, the Park will initiate studies in an attempt to better understand the effects of fire on the Lee and Sneed pincushion cacti. In the short-term, we expect that these cacti will be adversely impacted from the direct and indirect effects of fire. Still, it is likely that these cacti populations have persisted through repeated natural fire events. This project may have short-term adverse impacts on these plants, including mortality of up to 20 percent of the existing individuals. The proposed action includes a monitoring component that will contribute to the body of knowledge on the effects of fire on pincushion cacti. Conservation measures have also been incorporated to minimize impacts on these plants. Moreover, we understand that the Park Service will adaptively manage their FMP consistent with the proposed action. We find that this adaptive management will provide up-to-date information that the Park Service will incorporate to limit adverse effects to these cacti. Therefore, we find the proposed FMP and related fire monitoring will present opportunities for significant long-term benefits for these species.

As noted in the EA and BA, fire may have a positive indirect effect by reducing immediate plant competition or improving other vegetation and wildlife elements specific to the needs of the cacti (NPS 2005, 2005a). For example, Thomas (1997 cited in Stubbs 1998) found that fire can have a variety of effects on succulent species in semi-desert grassland, ranging from beneficial in low-intensity fires to extremely detrimental in high-intensity fires. We believe that adverse effects to the cacti will occur from WFURB and prescribed fires, as well as mechanical treatments.

Indirect effects

Indirect effects are those that are caused by, or result from, the proposed action, and are later in time, but are reasonably certain to occur. Rehabilitation activities are indirect effects resulting from the implementation of the proposed action. We expect that rehabilitation activities will only be utilized after wildfires. As noted, it is our understanding that the National Park Service will follow the Department of Interior guidance on the use of burned area emergency rehabilitation activities (BAER) (National Park Service 1999). These rehabilitation activities are variable and reflect the unpredictable nature of wildfires. We anticipate that the National Park Service will coordinate BAER activities with the Service. It is our expectation that the majority of these actions will likely result in insignificant and discountable effects to the cacti.

Additional indirect impacts to the cacti will likely occur from soil deposition from post-fire erosion, and reduced reproductive capability. Flowering capability of the cacti may also be reduced following fire. Moreover, individual plant mortality could be caused from root exposure due to soil loss. Removal and trampling of vegetation around individual cacti are expected to be short-term in duration and vegetation is expected to recover.

Interrelated and Interdependent Actions

The proposal includes fire management units on adjacent National Forest and BLM lands. The potential to manage or suppress fires on adjacent lands is considered interrelated and interdependent with the implementation of the proposed project. The inclusion of adjacent lands makes the management of fire safer, cheaper, and more likely to mimic natural patterns. For example, if fire extends beyond the Park boundary to lands within the Guadalupe Mountains Ranger District or the BLM, we anticipate that Sneed pincushion cacti will be adversely affected. Additionally, if Lee pincushion cacti occur within these adjacent lands, we would also expect this species to be adversely affected from these activities as described above. Therefore, we anticipate that these cacti may be adversely affected as a result of fire management activities on adjacent public lands.

The use of access roads and vehicles in the project areas are considered interrelated and interdependent with the implementation of the current project. Although the majority of vehicles will likely stay on roads and trails, effects of the project from interdependent and interrelated actions will likely result in cacti being crushed by vehicles or personnel while implementing the proposed FMP.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions on endangered or threatened species or critical habitat that are reasonably certain to occur in the foreseeable future in the action area considered in this biological and conference opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. Cumulative effects analysis as stated here applies to section 7 of the Act and should not be confused with the broader use of this term in the National Environmental Policy Act or other environmental laws. The Service's most recent assessment of the MSO and its habitat on non-Federal lands is found in the final rule designating critical habitat (USDI Fish and Wildlife Service 2004).

Mexican spotted owl

In past BOs, it has been stated that, "Because of the predominant occurrence of the MSOs on Federal lands, and because of the role of the respective Federal agencies in administering the habitat of the MSO, actions to be implemented in the future by non-Federal entities on non-Federal lands are considered of minor impact." However, future actions on non-Federal lands adjacent to the Park, Forest Service and BLM lands that are reasonably expected to occur include urban development, road construction, land clearing, logging, fuelwood gathering, and other associated actions.

Some activities that are likely to occur within the action area include various forms of recreation in MSO habitat. Such recreation can result in a variety of effects to MSO, primarily through disturbance of MSOs. However, recreation effects are likely minimal to nonexistent given the remote and inaccessible nature of MSO habitat. In summary, all of these activities reduce the quality and quantity of MSO nesting, roosting and foraging habitat, and cause disturbance to breeding MSOs and contribute as cumulative effects to the proposed action.

Sneed and Lee pincushion cacti

Lee pincushion cactus is found almost entirely within the Park's jurisdiction. Highway and trail maintenance activities could injure or kill some individuals. Herbicide applications along roadways could injure or kill individual plants. Construction and development of new trails, campgrounds or picnic areas within occupied habitat are threats to the cacti (U.S. Fish and Wildlife Service 1986). Additionally, actions on lands outside of the Park (e.g., creating fire breaks on State or private lands) can remove or degrade cactus habitat. Depending on the intensity of these actions, individual cacti can be killed or habitat may be fragmented. These types of activities contribute the cumulative effects to the proposed action.

CONCLUSION

Mexican spotted owl

After reviewing the current status of the MSO, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the MSO. This conclusion was reached because the proposed project is expected to assist the NPS in reintroducing and managing fire in the ecosystem within the action area. Intensive, destructive fires will likely occur less frequently and the treatments will minimize the potential risk of catastrophic wildfires damaging life, property, and natural resources. This will assist in lessening the threat of wildfire to the MSO and its habitat.

These conclusions are based on the following:

1. The implementation of the proposed FMP is not expected to impede the ability of the survival or recovery of the MSO within the Basin and Range East Recovery Unit or range-wide;

2. The NPS will conduct surveys to determine MSO occupancy and reproduction and, if appropriate, designate PACs;

3. The conservation measures included above will be implemented to minimize or avoid effects to the MSO and its habitat;

4. The proposed project is generally considered consistent with the intent of Recovery Plan;

5. Fires are a natural part of the ecosystem in which the MSO has evolved. The chance of catastrophic fire in the area, which is one of the concerns for MSO described in the Recovery Plan, will decrease from current levels. The Recovery Plan recognizes the importance of allowing fire to return to southwestern forests.

6. We anticipate no more than 700 acres of unsurveyed potentially occupied MSO habitat to be affected to a significant extent from WFURB, prescribed fires, or suppression activities (see take statement below); and

7. Suppression activities from future forest conditions without managed fire would likely be much greater than under the current proposal.

Sneed and Lee pincushion cacti

After reviewing the current status of the cacti, the environmental baseline for the action area, the effects of the proposed fire management plan, and the cumulative effects, it is the Service's biological opinion that implementation of the preferred alternative, as proposed, is not likely to jeopardize the continued existence of the cacti. No critical habitat has been designated for these species, therefore, none will be affected.

These conclusions are based on the following:

1. The implementation of the proposed FMP is not expected to result in high levels of cacti mortality;

2. These species evolved within fire as a natural part of the ecosystem. The chance of catastrophic fire in the area, should decrease from current levels; and

3. The Park Service will monitor and adaptively manage their FMP to limit adverse effects to these cacti.

INCIDENTAL TAKE

Mexican spotted owl

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting, or attempting to engage in any such conduct. Harass is further defined by us as intentional or negligent actions that creates the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, and sheltering. Harm is further defined by us to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of the agency action is not considered a prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement. The measures described below for the MSO are non-discretionary and must be implemented by the NPS so that they become binding conditions of any grant or permit issued, as appropriate, in order for the exemption in section 7(o)(2) to apply.

The NPS has discretion to regulate the activity that is covered by this incidental take statement. If the NPS: 1) fails to require that any permittee or contractor adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit, grant, or contract document and/or, 2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, we recommend that the NPS report the progress of the action and its impact on the MSO to the Service as specified in the incidental take statement.

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, limited protection of plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of Federally endangered plants or the malicious damage of such plants on areas under Federal jurisdiction, or the destruction of endangered plants on non-Federal areas in violation of State law or regulation or in the course of any violation of a State criminal

trespass law.

Amount or extent of take

Our policy states that incidental take can only be supported if an activity compromises the integrity of an MSO PAC (USDI Fish and Wildlife Service 1996). In this BO, we have used the term unsurveyed potentially occupied habitat to analyze the effects of the proposed action on the MSO and its habitat. Because areas that may support MSOs have not been surveyed within the Park and MSOs are known to breed on adjacent lands (e.g., Guadalupe Ranger District), we assume that MSOs are present within the Park. For this reason, the Service anticipates that the proposed action will result in incidental take of MSOs in the form of harm and harassment due to potential for significant habitat alterations of MSO habitat from WFURB, prescribed fire, or suppression activities. This determination is based on the knowledge that the proposed action has the potential to either alter MSO habitat or directly affect MSOs (USDI Fish and Wildlife Service 1995).

Using available information as presented within this document, the Service has identified conditions of probable take for MSO. Based on the best available information concerning the MSO, habitat needs of this species, the project description, and information furnished by the NPS, take is anticipated to occur. This taking could be in the form of death, injury, harm or harassment of up to two adults and associated eggs/juveniles. We consider this take an upper limit anticipated for the life of the project (through fiscal year 2015). Any such take will be reported to the Service on an annual basis (see Reasonable and Prudent Measures). Take will be tallied when any PAC is affected (see below) and when each increment of 700 acres of unsurveyed habitat is affected by WFURB. Only that incidental take as described below which occurs will be tallied and reported in the MSO baseline. Therefore, although the NPS is permitted the incidental take below, such take will not be counted unless it occurs. Take is anticipated for the MSO as a result of the following:

a) WFURB which results in habitat modification of more than 700 acres of protected or restricted MSO habitat for which MSO protocol surveys (i.e., unsurveyed potentially occupied MSO habitat) have not been conducted (permitted take of 700 acres per year); or

b) prescribed fire burning within one MSO PAC that is known or suspected to be occupied during the breeding season (March 1 through August 31), (permitted take is one pair MSO and/or associated eggs/juveniles in the form of direct mortality); or

c) prescribed fire burning within the 100-acre core area or an area centered around the known or presumed nest location of an MSO PAC during the non-breeding season (September 1 through February 28), (permitted take is one pair MSO and/or associated juveniles in the form of harassment); or

d) prescribed fire burning at high-intensity within greater than 10 percent of any MSO PAC during the non-breeding season (September 1 through February 28), (permitted take is one pair

MSO and/or associated juveniles in the form of harassment); or

e) WFURB or prescribed fire burning out of prescription, becoming a wildfire requiring suppression, and suppression actions occur:

1) within more than 700 acres of unsurveyed potentially occupied MSO habitat; or

2) within one MSO PAC that is known or suspected to be occupied during the breeding season (March 1 through August 31), (permitted take is one pair MSO and/or associated eggs/juveniles in the form of direct mortality); or

3) within the 100-acre core area or the area centered around the known or presumed nest location of an MSO PAC during non-breeding season (September 1 through February 28), (permitted take is one pair MSO and/or associated juveniles in the form of harassment); or

3) within greater than 10 percent of any MSO PAC during the non-breeding season (September 1 through February 28), (permitted take is one pair MSO and/or associated juveniles in the form of harassment).

The Service anticipates incidental take of MSO located in unsurveyed/inadequately surveyed restricted or protected habitat will be difficult to detect because finding a dead or impaired individual is unlikely due to the large acreage of potentially affected habitat in the project area and the remoteness of much this habitat. We recommend that if, during the ten-year duration of the proposed action, any unsurveyed potentially occupied MSO habitat or designated PAC is affected in one or more of the manners described above, the Park contact our office to determine if reinitiation of consultation is necessary.

Effect of the take

In the accompanying BO, the Service determined that this level of anticipated take is not likely to jeopardize the continued existence of the MSO.

Reasonable and Prudent Measures for the MSO

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take.

1) The NPS shall conduct all WFURB or prescribed fire activities in a manner that will minimize adverse affects to the MSO and minimize modification and loss of MSO habitat.

2) The NPS shall document all actions, report incidental take, and monitor the effects of the proposed action.

3) If fire suppression is initiated, suppression activities shall be carried out in a manner that minimizes adverse affects to the MSO and minimizes modification and loss of MSO habitat, unless such actions would threaten life or property. This represents the indirect effects of WFURB or prescribed fire burning out of prescription or the direct effects of suppressing a naturally-ignited wildfire.

Terms and Conditions for the MSO

In order to be exempt from the prohibitions of section 9 of the Act, the NPS and their employees, contractors, or subcontractors must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

The following Terms and Conditions are established to implement Reasonable and Prudent Measure 1:

1.1 Where physically practicable and in a manner that does not compromise human safety in any way, delineate 100-acre core area or the area centered around the known or presumed nest location for each PAC. Identify and use these areas to reduce adverse effects to the MSO from prescribed fires by managing or retaining key MSO habitat components, without impeding the objectives of the FMP.

1.2 If it becomes apparent that a fire might enter MSO habitat and affect a PAC, to the extent practicable, attempt to determine the location and breeding status of MSO in that PAC.

1.3 All field personnel who implement any portion of the proposed action shall be informed of regulations and protective conservation measures as described in this biological opinion, the environmental assessment, and the biological assessment for the MSO.

1.4 During any emergency situation, the primary objective for the MSO is to provide recommendations for minimizing adverse effects without impeding response efforts. During emergency events, protecting human life and property should come first every time. Consequently, no constraints for protection of MSO habitat are necessary if they place human lives or structures (e.g., houses) in danger.

1.5 The NPS shall ensure that all pertinent information from the reasonable and prudent measures of this biological opinion is included in the final burn plans for all fire management actions.

1.6 The Forest Service shall ensure that no more than 700 acres of unsurveyed, potentially occupied MSO nest/roost habitat is affected by WFURB each year.

The following Terms and Conditions are established to implement Reasonable and Prudent Measure 2:

2.1 The NPS shall document all actions, report incidental take, and monitor the effects of the proposed action on the MSO and its habitat. Those findings shall be reported to us by December 31 of each year. The report shall document the areas and acreage burned, the type of fire (prescribed fire, WFURB, wildfire), the name(s) of any PAC(s) subjected to fire, the extent of any suppression actions, the implementation and effectiveness of the terms and conditions of this biological opinion, information about MSO monitored or encountered (including MSO surveys that were conducted), any rehabilitation completed, quantification of any incidental take as defined in this biological opinion, and any recommendations for actions in the upcoming year(s). Maps shall also be provided which will include each fire event and thinning activities that occurred. This action will ensure the environmental baseline for the MSO is reviewed annually to rectify anticipated effects with those that occurred.

2.2 The NPS will ensure that sufficient monitoring of the effects of fire on key habitat components of MSO habitat will be conducted after each fire event. Such monitoring shall be consistent with NPS monitoring requirements and protocols.

2.3 To the extent practicable, the NPS's will conduct fire-severity monitoring in MSO habitat after each fire event. If the observed proportion of the event in high to moderate-to-high severity categories is greater than that expected in the incidental take statement of this biological opinion, then prescriptions will be adjusted to ensure that fire severity of future events are reduced.

The following Terms and Conditions are established to implement Reasonable and Prudent Measure 3:

3.1 The NPS shall promptly notify the New Mexico Ecological Services Field Office of any declared wildfire actions in MSO habitat.

3.2 A Resource Advisor will be available for all activities that affect MSO habitat associated with the fire management. Resource Advisors shall be knowledge of the MSO and its habitat. The Resource Advisor shall possess maps of all PACs and/or modeled MSO habitat in the project area. The Resource Advisors shall coordinate MSO concerns and serve as an advisor to the Incident Commander/Incident Management Team. He/she shall also serve as field contact representative responsible for coordination with our New Mexico Field Office and shall monitor fire-related activities to ensure protective measures endorsed by the Incident Commander/Incident Management Team are implemented.

3.3 All fire suppression actions in MSO habitat will occur, to the maximum extent possible, using minimum impact suppression tactics. This will include actions

consistent with the Recovery Plan such not removing trees over 9 inches dbh in PACs unless it is deemed necessary for tactical and/or safety reasons or to prevent the fire from affecting additional MSO habitat.

3.4 Fire operations will proceed without helicopter flight over occupied protected activity centers (PACs) during the breeding season (March 1 through August 31), except in emergency life-threatening situations, when it is tactically necessary, or when human structures are in danger.

3.5 MSO habitat disturbed during fire suppression activities, such as fire lines, crew camps, and staging areas, shall be rehabilitated to prevent their use by vehicles or hikers.

3.6 The Park shall use identified MSO habitat to prioritize areas for protection, and locate access points for suppression, WFURB, and prescribed burning activities. This information will be communicated in advance (when feasible) to fire management personnel. For example, fire camps, staging areas, and any other areas of disturbance created for fire suppression actions shall be located outside of MSO habitat, whenever possible.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the agency's section 7(a)(1) responsibility for these species. In order for us to be kept informed of actions that either minimize or avoid adverse effects or that benefit listed species and their habitats, we request notification of the implementation of the conservation recommendations. We recommend the following conservation recommendations be implemented:

Mexican spotted owl

1. The NPS should conduct MSO surveys and where appropriate designate PACs in the Park.

2. The NPS should design and implement experimental fire treatments as recommended in Bond et al. (2002) (enclosed).

3. The NPS should meet with the Service annually to share fire and MSO information. Using these data, the Service will reassess the amount of take and provide any additional guidance or clarifications to this biological opinion as necessary to facilitate project

implementation.

4. The NPS should work within an adaptive management context with regards to fire management activities in MSO habitat.

5. The NPS should consider implementing the discretionary conservation recommendations identified in Appendix A during emergency wildfire suppression. Protecting human life and property should come first every time. Consequently, no constraints for protection of listed species or their critical habitat are recommended if they place human lives or structures in danger.

Sneed and Lee pincushion cacti

1. The Park Service should attempt to survey all potential cactus habitat within the fire management unit number two during the cacti flowering season (typically April and May).

2. The Park Service should attempt to obtain permission to survey for cacti on the surrounding private land.

3. The Park Service should cooperatively survey adjacent National Forest or BLM lands to determine whether Lee pincushion cactus occupies these areas.

4. Any suspicious collection related activity within the Park should be reported to the Service.

DISPOSITION OF DEAD OR INJURED LISTED ANIMALS

Upon finding a dead, injured, or sick individual of an endangered or threatened species (e.g., MSO), initial notification must be made to the nearest Service Law Enforcement Office. In New Mexico, contact (505/346-7828) or the New Mexico Ecological Services Field Office (505/346-2525). Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph, and any other pertinent information. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible condition. If feasible, the remains of intact specimens of listed animals shall be submitted to educational or research institutions holding appropriate State and Federal permits. If such institutions are not available, the information noted above shall be obtained and the carcass left in place.

Arrangements regarding proper disposition of potential museum specimens shall be made with the institution before implementation of the action. A qualified biologist should transport injured animals to a qualified veterinarian. Should any treated listed animal survive, we should be contacted regarding the final disposition of the animal.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the proposal to implement the USDI National Park Service Carlsbad Caverns National Park Fire Management Plan, New Mexico. As required by 50 FR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may impact listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action.

In future communications regarding this project, please refer to consultation number 2-22-04-F-128. If you have any questions or would like to discuss any part of this biological opinion, please contact Eric Hein of my staff at (505) 761-4735.

Sincerely,

Susan MacMullin

Susan MacMullin
Field Supervisor

cc:
Field Supervisor, USDI Fish and Wildlife Service, Arizona Ecological Services Field Office, Phoenix, Arizona
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Appendix A

Conservation Measures for Emergency Wildfire Suppression

For any fire suppression activity, we recommend you consider implementing the following measures. We stress that firefighter and public safety is the first priority in every fire management activity. We also recognize that you must set priorities among protecting human communities and community infrastructure, other property and improvements, and natural and cultural resources based on the values to be protected, human health and safety, and costs of protection. However, if these measures can be implemented, effects to listed species and their habitats will often be much reduced. We may recommend additional measures, or modifications of the measures below, during suppression activities.

1. All personnel on the fire should be informed about listed species and the importance of protecting their habitats and minimizing take. This is best identified in the incident objectives.

2. Resource Advisors are designated to coordinate natural resource concerns including listed species and other resources. Resource Advisors may do any of the following: identify protective measures endorsed by the Incident Commander; survey prospective campsites, aircraft landing and fueling sites; and perform other duties necessary to minimize adverse effects to listed species and their habitats. Resource Advisors and monitors should be on call at all times during the fire season.

3. Whenever possible, crew camps, equipment staging areas, and aircraft landing and fueling areas should be located outside of listed species habitats, and preferably in locations that are previously disturbed. If camps must be located in listed species habitat, the Resource Advisor should be consulted to ensure habitat damage and other effects to listed species are minimized and documented.

4. The effectiveness of suppression activities and listed species minimization measures should be evaluated after a fire. Procedures should be revised as needed.

5. Minimize disturbance to the MSO during emergency rehabilitation activities.

6. Treat MSO protected and restricted habitat according to Recovery Plan standards unless overriding management situations require their removal to protect human safety and/or property (e.g., the removal of hazard trees along roads, in campgrounds, and along power lines).

7. Snags or hazard trees should be felled only when essential for control of the protection of structures or resources, or for safety of personnel.

8. All treatments should retain some trees greater than 18 inches dbh to the extent that it does not impede the objectives of stabilizing and preventing unacceptable degradation to natural and cultural resources, minimizing threats to life or property resulting from the effects of the fire, or

to repairing/replacing/constructing physical improvements necessary to prevent degradation of land or resources.

9. When feasible, existing roads or trails should be used during rehabilitation activities. All new temporary or reopened roads should be closed following project completion, both within and outside of MSO habitat.

10. Resource advisors or biologists familiar with the MSO should be on the BAER team. These resource advisors should be utilized to ensure that activities do not adversely affect the MSO and are aware of all sensitive areas (e.g., PACs).

11. The use of dozers should be minimized and resource advisors should be consulted when appropriate. Dead or dying trees should be cut or limbed only to the extent needed. Rehabilitation of any fire lines should be considered.

12. Staging areas for equipment should not be located within riparian areas or MSO habitat.

13. Burned area emergency rehabilitation (BAER) activities should be consulted on independently unless these activities are truly considered emergency actions. We encourage monitoring the effectiveness of these actions after major fires

14. When the BAER plan is finalized, provide a copy to the Fish and Wildlife Service.

Appendix B

Table 1. Wildland fire use decision criteria

Decision Criteria	Questions[1]
Ignition	Is it a natural source? Is the location within the wildland fire use zone?
Management Objectives	Are resource objectives being met? Are potential effects on natural and cultural resources within the acceptable range of effects and variability?
Size	Is the current and expected size known? Would an escape or the potential for escape from the maximum management area be acceptable?
Fuels	Are live fuel moistures within prescription?
Weather	Are local forecasts and drought indicators (1000-hr TLFM, Palmer drought index) acceptable?
Topography	Is the terrain accessible and safe for crews to work in locations for potential holding actions along the maximum management area?
Resource Availability	Are local, regional or national resources available?
Safety of Life and Property	Can the threats to firefighters, staff, visitors, residents, neighbors, associated property and infrastructure be minimized?
Environmental Constraints	Is smoke dispersal and direction acceptable?
Political Constraints	Is managing this fire for wildland fire use compliant with current policy, moratoriums, political constraints, funding and efficiency issues?

[1]Must answer Yes to all criteria to reach a Go decision on wildland fire use. Any No answers result in a No-Go decision, declaration of a wildfire, and initiation of suppression activities. Once a wildfire is declared, the fire cannot be reverted to wildland fire use.